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Implicit Cognition and the Social Evaluation of Speech

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Abstract

For the past three decades, psychological research has repeatedly shown that it is not always necessary for us to be conscious of events in order to perceive them, a phenomenon referred to as implicit cognition (Underwood & Bright 1996). Although this has been the subject of much research in the disciplines of psychology and social psychology, sociolinguists have only recently begun to examine how implicit cognition functions with regards to how we perceive speech (Campbell-Kibler 2012). Consistent with social psychology research on implicit responses to visually-derived social information (Greenwald *et al* 1998; Karpinski & Hilton 2001), recent sociolinguistic research suggests that listeners make differing conscious and unconscious social evaluations upon hearing different regional and foreign-accented speech varieties (Kristiansen 2009; Pantos & Perkins 2013), and that this is at least partly driven by socially-marked phonetic variation (Campbell-Kibler 2012, 2013).

While previous research has investigated this phenomenon in relation to different regional or international varieties of English, the current study investigates the conscious and unconscious associations listeners make towards different social accents in Glasgow. This was achieved over three experiments by adapting an established psycholinguistic eye tracking methodology for sociolinguistic research. The first experiment (N=32) was conducted without eye tracking, relying on pencil and paper responses. Participants were tasked with choosing between on-screen 'working-class' and 'middle-class' target images (determined via a separate norming task) of brand logos and objects while recordings of different speakers uttering words semantically related to both images were heard. Non-significant trends were found in the data, with participants more likely to choose 'working-class' brand logos when a working-class speaker was heard and 'middle-class' logos when a middle-class speaker was heard. A second experiment (N=42) recorded listener eye movements in real time towards the same experimental stimuli, finding listeners to have been significantly ($p<.05$) more likely to fixate upon 'working-class' brand logos when hearing a working-class speaker than when hearing a middle-class speaker. Listeners' verbal choices of brand logos showed no significant effect of speaker heard, showing a divergence between the on-line and off-line responses made towards speakers. Conversely, the speaker heard was found to have had a significant ($p<.05$) effect on the images of objects verbally chosen by listeners, but no effect on fixations made towards objects. A third experiment (N=54) investigated listener fixations towards brand logos while hearing words containing different socially-marked phonetic variants. Socially-marked phonetic realisations of CAT, post-vocalic/post-consonantal /l/, and non-prevocalic /r/ were all found to have elicited significant ($p<.05$) effects on listener fixation behaviour, with response times ranging from 300-700ms. A supplemental subjective reaction test (N=60) found participants to have evaluated middle-class Glaswegian speakers significantly ($p<.05$) more favourably in terms of Zahn & Hopper's (1985) status attributes than working-class Glaswegian speakers, in line with the findings of previous language attitude studies (Preston 1999; Zahn & Hopper 1985; Kristiansen 2001).

Overall, the results indicate that speech varieties with varying levels of perceived social status elicit differing conscious and unconscious social evaluations in listeners, and that socially-marked phonetic variation plays a role in this.

Dedication

This thesis is dedicated to my parents, who can't read it, my wife, who won't read it, and my infant son, who can't read.

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Declaration

This thesis is a presentation of my original research work. Wherever contributions of others were involved, every effort is made to indicate this clearly with due reference to the literature. This research was carried out under the guidance of Prof. Jane Stuart-Smith, Dr. Rachel Smith, and Dr. Christoph Scheepers at the University of Glasgow, UK.

Duncan Robertson
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Chapter 1

Introduction

This thesis presents an experimental investigation of implicit sociolinguistic cognition — the notion that language can trigger, within listeners, varying automatic and unconscious social evaluations of speakers. Although there has been relatively little research on this phenomenon to date, recent studies suggest that listeners make differing conscious and unconscious evaluations of speakers based upon both regional and foreign accent features (Kristiansen 2009; Pantos & Perkins 2013; Campbell-Kibler 2012, 2013). The purpose of this doctoral research was to investigate whether or not the same holds true when people encounter speakers of different social accents and, if so, the specific sociolinguistic features related to the formation of unconscious associations upon hearing speech.

The city of Glasgow provides an ideal linguistic background for studying listener evaluations of socially divergent speech varieties, being home to both heavily stigmatised working-class vernacular and relatively prestigious middle-class accents of English (Macaulay 1977; Macafee 1983, 1988; Menzies 1991; Torrance 2003). Furthermore, previous research has shown that Glaswegian listeners are able to categorise working and middle-class Glaswegian accents based solely on the presence of class-typical phonetic variants (MacFarlane & Stuart-Smith 2012).

In a departure from previous investigations of implicit sociolinguistic cognition, which have favoured Greenwald *et al*'s (1998) Implicit Association Test,

this study utilises the Visual World Paradigm — an established psycholinguistic research paradigm which involves the real-time tracking of listener eye movements in response to spoken language. To date, Visual World experiments have primarily been used to study the cognitive processing of semantic and pragmatic information, but have also been implemented in a small number of sociolinguistic studies (cf. Koops *et al* 2008; Dahan *et al* 2008). Here, the methodology was adapted specifically to investigate unconscious social class evaluations, with Visual World studies devised to investigate the effect of differing social accents and socially-marked phonetic variation on the automatic associations made by listeners upon hearing speech.
The current research represents a continuation of a short masters dissertation, which served as a tentative first step, and is briefly summarized here by way of providing necessary background for the development of the experimental paradigm (Ch. 3). Following on from the initial pilot study (N=40), this thesis presents the findings of an off-line speaker evaluation task (N=32) which tested elements of the methodology prior to implementing eye tracking, a Visual World experiment (N=42) investigating listener associations made upon hearing two speakers of socially contrasting Glaswegian accents, another eye tracking experiment (N=54) investigating the role of socially marked phonetic variation on listener associations, and a subjective reaction test (N=60) investigating listeners' explicit evaluations of those speakers.

The specific research questions which the study aimed to answer were formulated as follows:

1. Does social information encoded within the speech signal impact upon the implicit associations made by listeners?

2. Does socially-marked phonetic variation impact upon the implicit associations made by listeners?

3. What is the time-course of implicit sociolinguistic cognition?

To briefly address these questions (which are answered in detail in section

9.0.2), the Visual World experiments revealed different social accents and socially-marked phonetic realisations to have triggered differing associations in listeners, with significant differences in fixation behaviour observed from 300ms after the onset of socially-marked phonetic realisations, indicating that such associations were made unconsciously. Furthermore, the results were largely in line with previous research on the topic, adding to a growing body of evidence for implicit sociolinguistic cognition.

Chapter 2

Background

Research on implicit sociolinguistic cognition is a truly interdisciplinary area of investigation, existing primarily at the intersection of sociolinguistics and social psychology — disciplines which, although sharing many commonalities, have traditionally been considered to be largely unrelated fields — while also drawing upon techniques and theoretical frameworks from psycholinguistics, phonetics, and cognitive psychology. While in no means an exhaustive account of these subject areas, this literature review attempts to give a brief overview of some of the most relevant research in each discipline to the specific thesis topic, while also outlining methodological developments in key areas. This includes the development of attitudinal research and characteristics of attitudes in social psychology (p.16), the subsequent development of the study of language attitudes in sociolinguistics (p.23), and the effect of fine phonetic variation on social evaluations of speech (p.30). This section then outlines why Glasgow provides an ideal linguistic background for this research (p.37), before summarising the key points from each section (p.41).

After chapters outlining 2 preliminary experiments, the literature review is continued in a second part (Chapter 5) which outlines early psychological research on implicit cognition (p.66) via subsequent investigations on implicit social evaluations in social psychology (p.72), and to the specific thesis topic of implicit sociolinguistic cognition (p.87). The review then touches upon the theoretical basis of implicit cognitive processing (p.95), before discussing the development and key points of the research methodology used to examine implicit associations in this study (p.99).

2.1 Attitudes

Attitudes are of central importance both in the fields of social psychology, a discipline which was originally defined as 'the scientific study of attitudes' (Ajzen & Fishbein 2005: 174), and in sociolinguistics, a discipline which 'has always shared overlapping concerns and involvement [with social psychology]' (Garrett 2001: 626). Furthermore, prominent social psychologists, such as Allport (1954: 43), have long considered attitudes to be 'the most distinctive and indispensable concept' in the field.

Despite the notion of attitudes being fundamental to both disciplines, the term has been given many varying definitions over time. Thurstone (1931), for example, defined an attitude as 'affect for or against a psychological object', Allport (1935: 810) as 'a mental and neural state of readiness, organized through experience, exerting a directive and dynamic influence upon the individual's response to all objects and situations with which it is related', and Krech & Crutchfield (1948: 152) as 'an enduring organisation of motivational, emotional, perceptual, and cognitive processes with respect to some aspect of the individual's world'. Over two decades later, Sarnoff (1970: 279) defined attitudes as 'a disposition to react favourably or unfavourably to a class of objects', Bem (1970: 14) simply as 'likes and dislikes', and Eagly & Chaiken (1993: 1) as 'a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor' — with the unifying feature that they all 'describe some way in which positivity or negativity is linked to some attitude object.' (Olson & Fazio 2009: 20).

Attitudes were originally thought to have a degree of permanence, with Allport (1935: 814) noting that attitudes 'often persist throughout life in the way in which they were fixed in childhood or in youth', Sherif & Cantril (1947: 7) stating that 'attitudes, once formed, are more or less enduring states of readiness', and Petty & Cacioppo (1981: 7) defining attitudes as 'an enduring positive or negative feeling about some person, object, or issue.' Furthemore, Garrett (2010: 20) defines an attitude as 'an evaluative orientation to a social object of some sort, whether it is a language, or a new government policy, etc.', with the characteristic that such evaluations have 'a degree of stability that allows it to be identified.'

Early attitudinal surveys which relied on self-reports appear to confirm that attitudes can, indeed, persist over time. Brown (1970), for example, had students recruit two friends — one knowledgeable about and interested in politics and the other comparitively disinterested in politics (or 'articulates' and 'inarticulates', as defined by Brown) — to complete attitudinal questionnaires (N=36) which tasked them with indicating their level of agreement with various political statments. Twelve participants (consisting of six 'articulates' and six 'inarticulates') were then contacted every two weeks to resit the experiment until, after six weeks, each participant had completed the questionnaire twice. The attitudes of both 'articulate' and 'inarticulate' participants were found to have remained stable across both tests, and at all time points ($p<.01$).

A decade later, Bishop *et al* (1980) conducted surveys (N=115) among two groups of middle-aged men and women, 56 of whom had attended college, to determine their attitudes towards seven different political issues. Each participant was given the same survey twice, with the second survey given between nine and eleven months after the first. The results found a high degree of correlation between the answers given in the first and second surveys of participants who had attended college, but little correlation in the answers of participants who had not. While the results demonstrate that the attitudes of individuals can either remain constant or change over time, they also highlight the problem with generalising the results of attitudinal research conducted on college students to the wider populace — a consideration which is still very much relevant in social science research today.

In another study, Marwell *et al* (1987: 364) conducted attitudinal surveys (N=145) of white US civil rights activists in both 1965 and 1985, using Likert scales which prompted participants to state their level of agreement with questions such as:

> We hear a lot of talk these days about liberals and conservatives. Here is a seven-point scale on which the political views that people might hold are arranged from extremely liberal to extremely conservative. Where would you place yourself on this scale, or haven't you thought about it much?

The study found the political attitudes of the activists to have remained consistently liberal over the 20 year period, with the responses to most questions indicating 'a remarkable level of stability regarding a very wide range of issues.' (Marwell *et al* 1987: 373). While all three studies investigated only political attitudes, Erber *et al* (1995: 433) note that 'Other kinds of attitudes are also notorious for their resistance to change, such as prejudiced and racist opinions.'

Other studies, however, have found attitudes to be highly dependent on context — such as question order or question wording (Schwarz & Bohner 2001: 436). Hippler & Schwarz (1986), for example, performed a face-to-face survey (N=88) in which forty eight subjects were asked if peep shows should be allowed and the remaining forty asked if they should be forbidden. In a replication (N=146), seventy two subjects were asked if the showing of X-rated movies in public cinemas should be allowed and seventy four asked if it should be forbidden (Hippler & Schwarz 1986: 90). The results showed respondents to have been 23.3% more likely to state that peep shows should not be allowed than state that they should be forbidden, and 14% more likely to state that X-rated movies in public cinemas should not be allowed than state that they should be forbidden, a finding which Hippler & Schwarz (1986: 91) claim arose 'as a function of question wording'.

In Bickart's (1992) telephone survey (N=181) about running shoes among 81 runners and 100 non-runners, the order in which participants were asked questions was found to have had a significant ($p<.05$) effect on participant ratings of different shoe brands. Similarly, Billiet *et al* (1992) conducted a questionnaire (N=370) among married women in Ghent, Belgium, which contained attitudinal questions that differed slightly in wording or sequence.

For example, one version of the questionnaire (given to 179 participants) contained a 'specific' question followed by a 'general' question, as follows (Billiet *et al* 1992: 134):

> Do you think it should be possible for a pregnant woman to obtain a legal abortion if there is a strong chance of serious defect in the baby? *(Birth defect item: specific)*
> Do you think it should be possible for a pregnant woman to obtain a legal abortion if she is married and does not want any more children? *(Woman's right item: general)*

In another version of the questionnaire, given to 191 participants, the same questions appeared in reverse order. Respondents were found to have answered yes to the 'general' question significantly (p=<.001) more often when it appeared before the 'specific' question (56.1%) than when the sequence was reversed (39%). The order in which questions appeared had virtually no effect, however, on participant responses to the 'specific' question (89.1% vs. 93.1%). A similar effect of question order was found in participant responses to questions on increasing taxes on European vs. American products, with participants significantly (p=<.001) more likely to support higher taxes on American goods if they had answered yes to increasing taxes on European goods beforehand (37%, compared to 14.2% when asked about American goods first). This appears to affirm the postulation previously made by Feldman & Lynch (1988: 422), that 'cognitions activated in the process of making the first judgment may suppress the retrieval of cognitions that would have influenced the second judgment or behavior in the absence of prior measurement.'

While some researchers agree that the problem of such attitudinal instability is a methodological one (Schuman & Presser 1981), others opine that it reflects evaluative judgements being made 'based primarily on the information that comes to mind most easily' at any given time (Schwarz & Strack 1991: 46). Another view is that attitudes are, indeed, based upon the most easily accessible information that comes to mind while evaluative judgements are made, but that this information is stored in relatively stable memory structures (cf. Tourangeau 1992; Lord & Lepper 1999), while yet another view is that 'individuals may hold multiple attitudes about an object, accessing different ones at different points in time.' (Schwarz & Bohner 2001: 3).

Other researchers, however, posit that the stability of a given attitude is primarily related to the strength of the attitude (Erber *et al* 1995). It should be noted, however, that attitudes can be strong in a number of different ways, as Krosnick & Smith (1994: 283) outline:

> If stronger attitudes are indeed more resistant to change, they should show higher levels of stability. Consistent with this expectation, a number of studies have found more stability for attitudes higher in importance, extremity, evaluative-cognitive consistency, interest, and direct experience. Highly ambivalent attitudes have also been shown to be less stable over time.

Krosnick & Smith (1994: 280) identify ten different dimensions of attitude strength — extremity, intensity, certainty, importance, interest in attitude-relevant information, knowledge, accessibility, direct experience, latitudes of rejection and non-commitment, and evaluative-cognitive consistency. Under this framework, it is argued that these dimensions have implications for the stability of the attitudes which individuals hold in the following ways:

Extremity:
Attitudes which are extremely favourable or unfavourable towards objects are more resistant to change than more neutral attitudes.

Intensity:
Attitudes that evoke strong emotional responses are more resistant to change than attitudes that evoke little or no emotional response.

Certainty:
Attitudes which are considered by an individual to be certain are less likely to change than attitudes of which an individual is uncertain.

Importance:

Attitudes which an individual considers to be of great importance are more resistant to change than attitudes which are of less importance.

Interest:

Attitudes towards objects which an individual shows interest in are less likely to change than attitudes towards objects in which the individual has little or no interest.

Knowledge:

Attitudes related to subjects in which an individual has a greater degree of knowledge are more resistant to change than attitudes related to subjects in which an individual has a lesser degree of knowledge.

Accessibility:

Attitudes which come to an individual's mind easily are more resistant to change than attitudes which do not (most often measured by the time the individual takes to report an attitude towards an object).

Direct Experience:

Attitudes towards objects which an individual has direct experience of, or has participated in acitvities relating to, are more resistant to change than attitudes towards objects which an individual has no direct experience of.

Latitudes of Rejection and Non-commitment:

Attitudes which an individual considers to be unacceptable are more resistant to becoming adopted than attitudes which an individual finds neither acceptable nor unacceptable.

Evaluative-Cognitive Consistency:

Attitudes which are consistent with an individual's wider set of beliefs are more resistant to change than attitudes which are inconsistent with those beliefs.

These dimensions have been found to factor in peoples' attitudes in varying degrees across different studies. Pomerantz *et al* (1995), for example, conducted a selective judgement experiment (N=153) in which participants were first subject to an attitudinal questionnaire which tasked them with self-reporting the strengths of their attitudes towards a range of issues including capital punishment, legalized abortion, and environmental preservation. The questionnaire consisted of statements intended to assess aspects of attitude certainty, importance, and ego involvement (evaluative-cognitive consistency under Krosick & Smith's framework), with participants indicating their levels of agreement on 9-point Likert scales. Participants also indicated their overall attitudes towards each issue on a 17-point scale, the value of which was used as a measure of extremity, and asked to indicate how knowledgeable they were about each topic. In a second session, participants were split into two groups — with half being tasked with evaluating fabricated research reports on capital punishment and half tasked with evaluating actual newspaper editorials on the same topic. Participants were then informed that the researchers were interested in individuals' judgements of research/editorials on social issues, and tasked with assessing the quality of the materials presented before their attitudes towards capital punishment and attitudinal strength measures were reassessed. Participant attitudes were found to have correlated significantly ($p<.05$) with two distinct groups of attitude strength dimensions — those relating to the individual's self-concept, value system, and knowledge structure (termed the 'Embeddedness factor'), and those relating to one's commitment to a particular position, labelled the 'Commitment factor' (Pomerantz *et al* 1995: 416). Pomerantz *et al* (1995: 416) note that 'both heightened Embededdness and Commitment were associated with increased intentions to act on one's attitude'. Heightened Commitment was also found to have correlated with measures of selective judgment and attitude polarization (with participants who reported greater Commitment-related attitudes found to have been more likely to argue against attitude-incongruent material), whereas heightened Embeddedness correlated with 'greater self-reports of information seeking and decreased selective elaboration'.

In common with these findings, the attitudes which people hold towards different speech varieties have also been shown to cluster around common factors of attributes.

2.2 Language Attitudes

Since the 1970s, language attitudes have been a major focus of sociolinguistic research, largely kept separate from the wider body of attitudinal research carried out in social psychology (Garrett 2001). Conversely, language attitudes have been largely ignored in the domain of social psychology, despite speech offering 'some of the most socially rich stimuli in our environment' (MacFarlane 2014: 15). It seems reasonable to assume, however, that the attitudes which individuals hold towards language are comparable to attitudes held towards other attitude objects, and that the large body of attitudinal research carried out in social psychology can be of use in understanding attitudes towards language. As Fasold (1987: 148) explains, however, the term 'language attitudes' has come to encompass more than simply 'attitudes towards language':

> Language attitudes are distinguished from other attitudes by the fact that they are precisely about language. Some language-attitude studies are strictly limited to attitudes towards language itself [...] Most often, however, the definition of language attitude is broadened to include attitudes towards speakers of a particular language or dialect. An even further broadening of the definition allows all sorts of behavior concerning language to be treated, including attitudes toward language maintenance and planning efforts.

As in social psychology, attitudes towards speakers and speech varieties have frequently been examined by directly questioning informants about their beliefs and feelings towards attitude objects via interviews or surveys. Preston (1999), for example, reported on over a decade's worth of investigation into language attitudes in the United States, using a range of methodologies including attitudinal surveys and open interviews, as well as a map task (which had participants identify areas where regional accents are spoken on hand-drawn maps). The survey (N=147), which tasked participants in Michigan with rating their impressions of different regional accents on six-point semantic differential scales (containing attribute-dimensions such as *ugly-beautiful*), found participants to have rated Southern states almost universally lower in terms of 'correctness' than Northern states, suggesting a perception of Southern accents as non-standard and, subsequently, not 'correct'. This pattern continued over two broad sets of attributes, with accents which had been rated lowly in terms of 'correctness' also being rated poorly on a host of other traits. Preston (1999: 135) reduced these to two factor groups, one with attributes relating to *status* (such as 'smart, educated, normal, good English', and 'no drawl') and *group solidarity* (such as 'polite, casual, friendly', and 'down-to-Earth'). With the exception of the 'nasal' and 'polite' attributes, participant were found to have rated Northern states significantly ($p<.05$) higher in terms of *status* attributes than accents from Southern states. Conversely, with the exception of the 'polite' attribute, participants were found to have rated accents from Southern states significantly ($p<.05$) higher in terms of *group solidarity* attributes than accents from Northern states. This dichotomy, between 'standard' language varieties perceived as having high *status* and low *group solidarity* attributes, and 'non-standard' accents perceived as having low *status* and higher *group solidarity* attributes, is a recurring finding in language attitude research.

This was also evident in a large-scale attitudinal survey carried out as part of the BBC Voices[1] project. The study gathered participant responses towards different questions (such as *How much prestige do you think is associated with this accent?* and *How pleasant do you think this accent sounds?*) on 7-point scales, collating responses to 34 different regional UK English accents from 5,010 participants (Coupland & Bishop 2007: 77). Participants were found to have rated 'Standard English' as the most socially attractive and second most prestigious variety, and 'Queen's English' as the most prestigious and seventh most socially attractive variety (table 2.1). Respondents

[1] http://www.bbc.co.uk/voices/ [accessed 10/09/2014]

were also found to have rated an 'accent identical to [their] own' as the second highest variety in terms of social attractiveness and third highest in terms of prestige. Considering responses were gathered UK-wide, this suggests that people tend to rate their own speech varieties highly in terms of both social attractiveness and social prestige, even when those accents are non-standard regional accents. At the other end of the scale, participants rated Birmingham accents as being least socially attractive and least prestigious of the 34 varieties, along with the Black Country accents (rated 33 and 32 for social attractiveness and prestige, respectively), Asian accents (31, 33), Liverpool accents (30, 31), and Glaswegian accents (29, 29). In general, the most negatively rated accents in terms of both social attractiveness and prestige were those found in former industrial centers (such as Birmingham, the Black Country, Liverpool, and Glasgow). While the survey made no differentiation between the different social accents spoken in each region, relying only on respondents' own stereotypical ideas of the accents spoken in each region, it seems probable that they would have had the vernacular accents spoken in those regions in mind during the task.

Aside from the lack of auditory stimuli for participants to react to, the propensity of participants to be less candid in their responses when faced with uncomfortable or controversial questions brings the validity of survey data into question (Torrance 2003: 7-8). Furthermore, such methods presuppose that participants are both aware of their attitudes towards language and can articulate them in sufficient detail for meaningful analysis (Campbell-Kibler 2013). Due to these issues, the bulk of research has been conducted through the use of matched guise experiments and subjective reaction tests.

Lambert *et al* (1960) developed the match guise methodology, in which respondents unwittingly evaluate (using Likert or semantic differential scales) the same speaker adopting two different accentual guises. Although Lambert *et al* (1960) used bilingual Canadian French and English speakers in their study, it is now commonplace for matched-guise experiments to be carried out using monolingual speakers adopting different social or regional accents or accent features. Labov (1966) was among the first to do so, utilising auditory stimuli recorded from a group of female New Yorkers reciting the same

Mean ratings (whole sample, 5,010 informants) of 34 accents of English according to social attractiveness and prestige

	Social attractiveness	Prestige
1. Accent identical to own	4.87 **(2)**	4.14 **(3)**
2. Afro-Caribbean	3.72 **(21)**	2.90 **(30)**
3. Asian	3.21 **(31)**	2.74 **(33)**
4. Australian	4.04 **(13)**	3.51 **(11)**
5. Belfast	3.67 **(23)**	3.11 **(27)**
6. Birmingham	2.92 **(34)**	2.70 **(34)**
7. Black Country	3.16 **(33)**	2.81 **(32)**
8. Bristol	3.64 **(25)**	3.22 **(21)**
9. Cardiff	3.67 **(24)**	3.16 **(25)**
10. Cornish	4.22 **(8)**	3.38 **(13)**
11. Edinburgh	4.49 **(5)**	4.04 **(4)**
12. French	4.09 **(11)**	3.74 **(9)**
13. German	3.20 **(32)**	3.21 **(23)**
14. Glasgow	3.45 **(29)**	2.93 **(29)**
15. Lancashire	3.90 **(15)**	3.24 **(20)**
16. Leeds	3.73 **(20)**	3.15 **(26)**
17. Liverpool	3.40 **(30)**	2.82 **(31)**
18. London	3.70 **(22)**	3.89 **(6)**
19. Manchester	3.61 **(27)**	3.22 **(21)**
20. Newcastle	4.13 **(10)**	3.21 **(23)**
21. New Zealand	4.37 **(6)**	3.84 **(7)**
22. North American	3.90 **(15)**	3.80 **(8)**
23. Northern Irish	4.05 **(12)**	3.30 **(17)**
24. Norwich	3.81 **(18)**	3.38 **(13)**
25. Nottingham	3.78 **(19)**	3.39 **(12)**
26. Queen's English	4.28 **(7)**	5.59 **(1)**
27. Scottish	4.52 **(4)**	3.98 **(5)**
28. South African	3.51 **(28)**	3.34 **(16)**
29. Southern Irish	4.68 **(3)**	3.63 **(10)**
30. Spanish	3.88 **(17)**	3.29 **(18)**
31. Standard English	4.96 **(1)**	5.44 **(2)**
32. Swansea	3.64 **(25)**	3.11 **(27)**
33. Welsh	3.95 **(14)**	3.29 **(18)**
34. West Country	4.16 **(9)**	3.36 **(15)**

Table 2.1: Participant ratings of UK regional accents, BBC Voices project (from Coupland 2007: 98)

set of passages both with and without word-final post vocalic /r/ — a socially marked phonetic variable in New York English. These stimuli were presented to participants (N=102) who were then asked to indicate which occupations they perceived the recorded speakers to have from a choice of seven (including TV personality, Factory worker, and Receptionist), unaware that they were hearing each speaker twice – once with and once without post-vocalic /r/ realisations. The study found that listeners consistently associated the recordings featuring /r/ realisations with higher prestige occupations than the recordings featuring /r/ deletion.

Cheyne (1970) conducted another matched guise experiment (N=169) among different groups of Scottish participants in Glasgow, and English participants in London. Auditory stimuli consisted of read passages in both Standard English and regional Scottish guises recorded from four drama students, and single passages recorded from other speakers with Scottish and English accents. Participants were tasked with judging speaker attributes on six-point scales for 21 different attributes, consisting of 20 used by Lambert *et al* (1965) plus 'occupational status'. Cheyne (1970) reported both groups of listeners to have rated English voices significantly ($p<.01$) higher than Scottish voices in terms of perceived wealth, prestige, intelligence, and height, and Scottish voices higher than English voices in terms of friendliness. Both sets of speakers also rated English male voices significantly ($p<.01$) higher than Scottish male voices in terms of perceived ambition, leadership, cleanliness, good looks, and self-confidence. Scottish listeners, however, rated Scottish male voices significantly ($p<.01$) higher than English male speakers in terms of sense of humour, generosity, goodheartedness, likeability, and nervousness, and rated Scottish female voices significantly ($p<.01$) higher than English female voices in terms of 'entertainingness' and sense of humour, as table 2.2 (overleaf) illiustrates.

Similar evaluations have repeatedly found standard prestige language varieties (such as RP) to be rated higher in terms of 'prestige' features such as wealth, intelligence, and social status than non-standard regional language varieties. Giles *et al* (1975), for example, conducted another matched guise experiment which involved sending a university lecturer to present a talk

(Capitals: $P < 0{\cdot}01$ for all three pairs of voices; small type: $P < 0{\cdot}01$ for two out of three pairs.)

Male speakers: Scottish subjects	Male speakers: English subjects	Female speakers: Scottish subjects	Female speakers: English subjects
English voices rated higher			
WEALTH	WEALTH	WEALTH	WEALTH
PRESTIGE	PRESTIGE	PRESTIGE	Prestige
INTELLIGENCE	INTELLIGENCE	INTELLIGENCE	Intelligence
Height	Height	Height	Height
OCC. STATUS	OCC. STATUS	OCC. STATUS	
AMBITION	AMBITION	AMBITION	
LEADERSHIP	Leadership	Leadership	
CLEANLINESS	Cleanliness	Cleanliness	
Good looks	Good looks	Good looks	
SELF-CONFIDENCE	Self-confidence		
Scottish voices rated higher			
FRIENDLINESS	FRIENDLINESS	Entertainingness	
Sense of humour		Sense of humour	
GENEROSITY			
GOODHEARTEDNESS			
LIKEABILITY			
Nervousness			

Table 2.2: Differences in listener personality trait assessments of Scottish and English voices (from Cheyne 1970: 78)

to two groups of schoolchildren (aged 16-18 years), delivering the talk with an RP accent to one group, and with a Birmingham accent to the other. Both groups were subsequently asked to evaluate the lecturer after the talk, with the group who had heard him deliver the talk in RP rating him as significantly more intelligent than the group who had heard him deliver the talk in a Birmingham accent. Subjective reaction tests have also been used, in which participants responses to different speakers are evaluated, rather than the same speakers using different guises. Smith (1979), for example, conducted a subjective reaction test which tasked secondary school children in Newham (East London) with rating recordings of speakers of Cockney and speakers of RP accents. The children were found to have rated Cockney accents — their own speech variety — more negatively than RP accents across a range of personality traits, including friendliness, intelligence, kindness, 'hard-workingness', good looks, cleanliness, and honesty (Hudson 1996: 62). This is in line with subsequent accent studies, such as Coupland (2007), which showed people to rate standardised speech varieties (such as 'Standard English') more favourably than their own speech varieties in term of both social attractiveness and prestige attributes.

In attempt to make the findings of sociolinguistic attitude studies more comparable, Zahn & Hopper (1985) devised a measurement of language attitudes called the Speech Evaluation Instrument. Using a large-scale subjective reaction test (N=572), participants were presented with recordings of interviews and job interviews conducted with a range of speakers from different regional background across the US. Participants were tasked with rating speakers on 56 different personality traits according to semantic differential scales. Through factor analyses (considering a variable to be part of a factor if its loading was $>.50$ and all of its other loadings were $<.30$), Zahn & Hopper (1985) were able to reduce the personality traits to three factors which explained 64.5% of the variance in subject ratings. These factors were labelled *superiority* (encompassing traits such as intelligent, educated, upper-class, advantaged, wealthy, organised, and fluent), *attractiveness* (encompassing traits such as good natured, kind, warm, likeable, friendly, honest, and pleasant), and *dynamism* (encompassing traits such as active, talkative, aggressive, enthusiastic, strong, confident, and energetic).

As a whole, attitudinal research in sociolinguistics shows 'standardised' speech varieties to be evaluated more favourably in terms of attributes relating to social status than non-standard regional speech varieties, and non-standard regional speech varieties to be evaluated more favourably in terms of social attractiveness attributes than 'standardised' language varieties (Cheyne 1970; Giles 1975; Smith 1979; Zahn & Hopper 1985; Preston 1999; Coupland & Bishop 2007). It would also appear that such evaluations are driven, at least in part, by socially-marked phonetic variation (Labov *et al* 2011).

2.3 Sociolinguistic Perception

Evidence from various sociophonetic studies suggest that listeners both infer social information from fine phonetic variation, and use social information when processing speech (Strand & Johnson 1996; Niedzielksi 1999; Hay*et al* 2006; Campbell-Kibler 2009; Koops *et al* 2008; Labov *et al* 2011).

Strand & Johnson (1996) suggest that social information encoded within the speech signal, as well as visually-derived social information, can alter listener perceptions of phonetic variables. In the first of two experiments (N=28), listeners were given a lexical decision task involving four different stimuli voices. Stimuli voices had been chosen from 37 previously-rated voices in a separate task, with one selected on the basis of being 'the most prototypically male', another as being 'the most prototypically female', one as 'the most non-prototypically male', and the final as 'the most non-prototypically female' voice (Strand 1999: 89) . Stimuli were altered prior to testing, by concatenating synthesized fricatives on a nine-step continuum from /ʃ/ to /s/ with recorded utterances of codas from the words *sod* and *shod* for each speaker. Participants were tasked with deciding whether each word heard was *sod* or *shod* over 72 trials, with each participant hearing each iteration of the stimuli (9 synthetic fricatives applied to 2 words, for each of 4 speakers). Participants were found to have reliably identified more synthesized tokens as *sod* while hearing a male speaker than while hearing a female speaker. Strand & Johnson (1996: 20) reason that listeners' perceptual boundaries were conditioned by the perceived gender of the speaker heard, explaining that:

> longer vocal tracts generally produce lower-frequency resonances, and men generally have longer vocal tracts than women. So the fricatives produced by men will generally exhibit lower frequencies. Thus, the boundary between [ʃ] and [s] is generally at a lower frequency for men since lower formants are expected in their [s] compared with the same fricatives as produced by women. (...)

In a second experiment (N=24), participants were shown video recordings of either male or female faces while hearing synthesised-fricative tokens of *sod* and *shod*. Visual stimuli were drawn from 37 video recordings on the basis of masculinity/femininity ratings determined in a previous norming task (N=58), with the three 'Most male-appearing' and three 'Most female-appearing' faces selected (Johnson & Strand 1996: 21). These recordings were then overdubbed with the auditory stimuli used in the previous experiment, with the jaw opening motions seen in each video aligned with the vowel onsets of the auditory tokens. Testing was conducted over 4 blocks of 108 trials, with each stimulus item being presented once per block. Here, Strand & Johnson (1996: 21) found a significant ($p<.05$) main effect of 'face', with auditory tokens paired with male faces being identified as *sod* more often than auditory tokens paired with female faces. This suggests that, as in the McGurk effect[2], visual information can change our perception of phonetic variants. Moreover, it would appear that this effect also applies to visually-derived social information, such as speaker gender.

It was also established by Niedzielski (1999) that social information can impact upon listener processing of phonological space. For this study, Detroit-area residents were given perceptual tests (N=41) consisting of sets of resynthesised vowels along with accompanying questionnaires which asked them to choose the tokens that they felt best matched their own speech (Niedzielski 1999: 64). Participants were played around 50 sentences from the same speaker (a Detroit resident), being asked to focus on a particular vowel in each sentence before matching it with one of six computer resynthesised vowels (Niedzielski 1999: 64). Half of the respondents, however, were told that the speaker was from Michigan, while the other half were told that they were hearing a Canadian speaker, from a town directly across the Detroit

[2]The McGurk Effect demonstrates that speech perception is a multi-modal phenomenon. McGurk & McDonald (1970) discovered the effect by dubbing a videotape of a woman uttering /ga/ with the auditory syllable /ba/. Upon watching the tape back, they found that they perceived /da/. It was later discovered that hearing /ga/ and seeing someone produce /ba/ also causes listeners to perceive /da/, and that hearing /pa/ and seeing /ka/ causes perceptions of /ta/.

River (Niedzielski 1999: 64). As the perceived nationality of the speaker was the only aspect that varied between the two sets of respondents, it can be surmised that this factor alone caused the discrepancy between the results presented by the groups. The study found that those 'given the Canadian label chose raised-diphthong tokens as those present in the dialect of the speaker, whereas those given the Michigan label did not' (Niedzielski 1999: 62). The results point towards raised /aw/ being a Canadian stereotype among Detroit residents, who do not appear to be consciously aware that it is also a prominent feature of their own dialect.

Hay *et al* (2006) found that social information from visual stimuli can impact upon listener evaluations of speakers. In this study participants were given perceptual tests consisting of recordings of minimal pairs containing vowels in the NEAR/SQUARE merger-in-progress in New Zealand English. These tokens were played to most of the respondents alongside gender and age appropriate photographs of individuals presented as being the speakers (Hay *et al* 2006: 462). For some participants, visual stimuli consisted of 'two photographs of each of four individuals, and in each photograph the individual was dressed differently' (Hay *et al* 462). Here, each individual was pictured in attire and locations intended to portray them as being working-class in one photograph, and middle-class in the other. Participant responses were collected via questionnaires, with listeners being asked to identify and rate each token according to how they perceived its speaker in terms of age, level of education, and personality traits such as reliability, ambition, and friendliness (Hay *et al* 2006: 465). The content of the photographs was found to significantly (p=.003) affect listener accuracy, as the error rate for tokens with the greatest distinction between the NEAR/SQUARE vowels increased when they were accompanied by photographs portraying working-class speakers (Hay *et al* 2006: 478). Conversely, error rates were found to decrease when tokens were accompanied by pictures which portrayed the speaker as middle-class. Furthermore, participants who reported minimal pairs as being less merged were found to have made significantly (p=.02) more errors when shown pictures of older people.

Using a Visual World methodology, Koops *et al* (2008) examined the effect of speaker age on listener perception of vowels (specifically the PIN and PEN vowels in Houston, Texas), via means of a forced choice word identification task. Participants (N=24) were tasked with choosing between on-screen words containing different vowels while pictures of speakers (Anglo females of various ages) were displayed (as figure 2.1 overleaf, illustrates). Auditory stimuli, consisting of target words containing unmerged vowels, were simultaneously presented via loudspeaker. These consisted of tokens recorded from one 'younger' (32 year old) and one 'older' (49 year old) female speaker. Listener fixations were recorded throughout the experiment via a head-mounted eye tracker. Participants were given two seconds per trial to choose the word, via mouse click, containing the vowel which they thought most closely resembled the vowel in the target word played auditorily. The experiment found a significant (p=.024) effect of perceived speaker age in the 'older guise' (being presented pictures and recordings of an older speaker), with listeners fixating longer upon the 'competitor word' (displayed word containing the opposite vowel in the Houston PEN/PIN merger from the intended target word) than when the 'younger' or 'middle-aged' guises were presented (Koops *et al* 2010: 99). That the participants appeared to associate the merged pronunciation more with the older guises than with other age groups shows a clear effect of speaker age on listener vowel perception in this instance, an effect which Koops *et al* (2010: 100) attribute to a higher proportion of young and middle-aged Houstonians having emigrated from non-merged dialect areas than older Houstonians. From this, it appears that listeners draw upon their experience of their linguistic environment when processing familiar accents.

Furthermore, Campbell-Kibler (2009) found that the effect of fine phonetic variation on sociolinguistic evaluation is dependent on other social information which listeners deduce from the speech signal. The study examined listener perceptions of ING variation via qualitative data collected from open-ended group interviews (N=55) and quantitative data obtained from a matched-guise experiment (N=124). Auditory stimuli consisted of

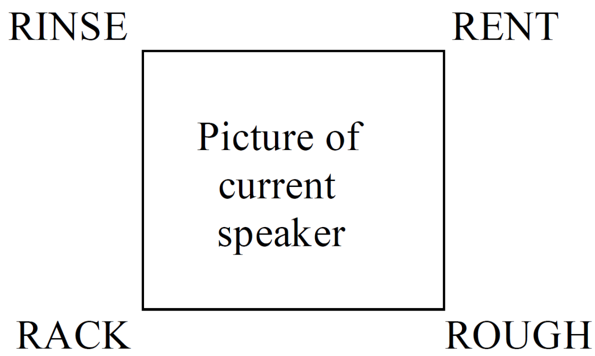
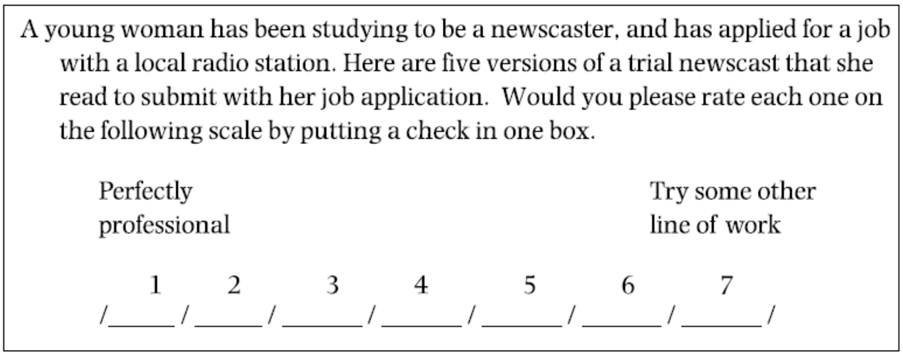


Figure 2.1: Illustration of visual display in Koops *et al* (2008: 95)

thirty two excerpts of spontaneous speech from eight different speakers (varied by gender and region) which were digitally altered to vary only in tokens of ING (/ɪŋ/ versus /ɪn/). Digital editing of the auditory stimuli allowed for close researcher control over the elements which were altered, serving to minimise other variables from impacting on listener responses. The results of the matched-guise experiment show a significant (p=.033) positive correlation between realisations of /ɪŋ/ and listener perceptions of speaker education and intelligence, but only in cases where speakers were perceived as being from 'working-class backgrounds' (Campbell-Kibler 2009: 148). These findings were not reflected in the group discussions, which 'usually involved an observation that all of the speakers sounded educated and middle-class' (Campbell-Kibler 2009: 144). This may be attributable to social class being, as Campbell-Kibler (2009: 144) observes, 'a relatively uncomfortable topic for interview participants', noting that 'regional differences emerged as the dominant theme for the interviews'. Listener perceptions of the regional origins of speakers were also found to impact on ING variation and perceptions of speaker intelligence and education – but only when those speakers were believed to be working-class (Campbell-Kibler 2009: 148). From this, Campbell-Kibler (2009: 148) extrapolates that 'This double of layer of interactions demonstrates ING's contextual dependence even with respect to one of its most central meanings.'

Labov *et al* (2011) conducted a series of matched guise experiments in

Pennsylvania investigating listener responses to differing frequencies of ING variation. In their first experiment (N=23), speakers evaluated a recording of a passage from a newscast containing different frequencies of /ɪŋ/ and /ɪn/ in ING contexts. Audio was recorded from a female speaker of a 'conservative Northern' US dialect, with stimuli tokens spliced together from two recordings — one with consistent /ɪŋ/ realisations in ING contexts, and the other with consistent /ɪn/ realisations in ING contexts. Participants were then played different stimuli tokens and asked to evaluate how well suited the speaker was for a job as a newsreader in each case (figure 2.2). Listeners rated the speaker as significantly (p<.001) more professional after hearing recordings containing between 0-30% /ɪn/ realisations, and significantly (p=.02) less professional after hearing recordings containing between 30-50% /ɪn/ realisations. After hearing stimuli containing 50% /ɪn/ realisations, participants also rated the speaker as significantly (p=.033) more professional when the first ING context was realised as /ɪŋ/ than when it was realised as /ɪn/. Higher proportions of /ɪn/ realisations (70% and 100%) were rated as increasingly less professional, but in smaller, non-significant (p>.068) increments.


A young woman has been studying to be a newscaster, and has applied for a job with a local radio station. Here are five versions of a trial newscast that she read to submit with her job application. Would you please rate each one on the following scale by putting a check in one box.

Perfectly professional — Try some other line of work

1 2 3 4 5 6 7
/_____/_____/_____/_____/_____/_____/_____/

Figure 2.2: Question and semantic differential scale used by Labov *et al* (2011: 438)

A second experiment (N=36) was conducted as a replication, with the only major methodological change being the addition of stimuli items containing 10% and 20% /ɪn/ realisations, and the inclusion of only one passage containing 50% /ɪn/ realisation. Participants were found to have responded in a similar manner, following a logarithmic curve with an r^2 of .96 and slope of 1.52. A third experiment (N=54) altered the design to gather participant responses to stimuli via an on-screen slider controlled by computer mouse, rather than a 7-point semantic differential, allowing for more fine-grained evaluations. A different speaker, an African-American linguist from Philadelphia, was also recording reading the same stimuli materials, both with 100% /ɪŋ/ realisations and no /ɪŋ/ realisations in ING contexts, from which stimuli containing various /ɪn/ frequencies were produced. Participants were found to have rated the stimuli in similar proportions to the previous two experiments, with ratings versus /ɪn/ frequency fitting a logarithmic curve with an r^2 of .97 (figure 2.3).

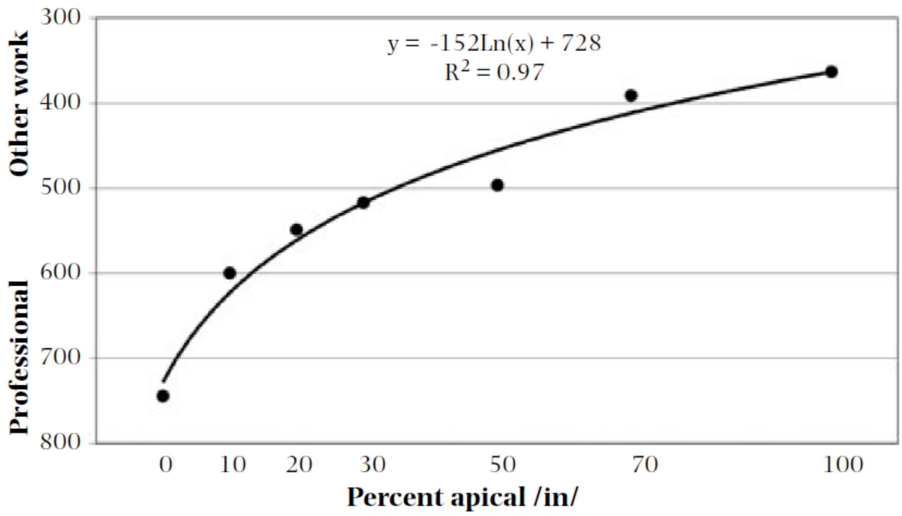


Figure 2.3: Mean subject ratings of newscaster in Experiment 3 with logarithmic progression, from Labov *et al* (2011: 445)

Labov *et al* (2011) also performed replications of the same experiment with the addition of stimuli recorded from a Southern speaker, both in South Carolina (N=55), in the South, and New Hampshire (N=51), in the North. Participants in both locations were found to have rated stimuli from the Southern speaker on a similar logarithmic curve as found previously, with r^2 of .96 and .98, respectively. Participants in South Carolina were also found to have rated stimuli from the conservative Northern speaker in on a similar curve (r^2=.96), but with a lower slope indicating that higher frequencies of

/ɪn/ are viewed as less unprofessional in the South. Participants ratings of the conservative Northern speaker in New Hampshire were found to have patterned differently, with stimuli being rated as least professional at 50% /ɪn/ frequency, increasing in professionalism ratings at 70% and 100% /ɪn/ frequencies. Another replication (N=42), however, found participant ratings to have patterned according to the logarithmic curve (r^2=.91) found previously.
Taken as a whole, the logarithmic curve found by Labov *et al*'s (2011) suggests that listener evaluations were affected more by the stigmatised phonetic variant (/ɪn/) than the non-stigmatised one (/ɪŋ/). It is not clear, however, if this is generalisable to other variables (cf. Levon & Fox 2014). Furthermore, the findings suggest that listener evaluations of phonetic variants are conditioned by the frequency of those variants in speech.

Nevertheless, these studies illustrate how visually-derived information, pre-conceived notions of speaker attributes, and the frequency of socially-marked phonetic variants can all have measurable effects on how listeners socially evaluate speech.

2.4 Linguistic Context

A city historically divided by social class, Glasgow retains a high level of social segregation to this day, with its large working-class population effectively kept separate from smaller middle-class groups (Pacione 1995; Maver 2000). As a result, the city continues to host two systematically varying social accents, existing on a bipolar sociolinguistic continuum between vernacular Glaswegian and Scottish Standard English (SSE; Aitken 1984; Macafee 1983, 1994; Stuart-Smith 2003). Although existing on a continuum, the primary Glaswegian speech varieties are generally recognisable as either working-class (Glaswegian vernacular) or middle-class (SSE) accents – and are readily categorisable as such by native listeners based solely on a group of socially marked phonetic features (MacFarlane & Stuart-Smith 2012).

In the past, explicit attitude studies have repeatedly shown working-class varieties of Glaswegian to be socially stigmatized in comparison to more prestigious, middle-class Glaswegian accents. The stigmatized view of Glaswegian vernacular speech has been documented at least as far back as 1930s, with elocution manuals such as McAllister (1938) making it clear that the vernacular was stigmatised (Macafee 1983). Macaulay (1977) carried out an study of language attitudes which included analyses of vowels and t-glottaling used among different social classes in Glasgow, finding clear social stratification in the pronunciations of Glaswegian speech and a range of negative attitudes towards the vernacular. These are perhaps best illustrated in the following quotation, collected in another section of the study, from a university lecturer: 'The accent of the lowest state of Glaswegian is the ugliest one can encounter, but that is partly because it is associated with the unwashed and the violent' (Macaulay 1975: 94). In response, Macafee (1983: 23) notes that the lecturer's statement 'simply reflects the very bad reputation of Glasgow generally. This stereotype has a blighting effect on working-class adolescents.'

A similarly derisory view of working-class Glaswegian was reported in qualitative sociolinguistic interviews (N=75) conducted by Macafee (1988: 5), which found young working-class speakers to have been perceived as 'foul mouthed' by adults, and who were thought to have considered their own speech as slang. This is line with Macualay's (1977: 132) assertion that 'the comments of employers, university lecturers and training college lecturers show that the main criticism of [working-class Glaswegian] school-leavers is their lack of confidence in speaking.' These comments were supported by Menzies (1991), who made use of a subjective reaction test and open-ended questionnaire in her investigation of the language attitudes of Glasgow schoolchildren towards Scots, 'Standard English', and the Glaswegian dialect. The children were found to have held 'underlying negative attitudes to their spoken vernacular', with girls being 'much more likely than boys to have prejudiced attitudes towards Scots and to incline their speech towards the standard; and this phenomenon increases with age' (Menzies 1991: 45).

Nevertheless, working-class varieties of Glaswegian have also been demonstrated to hold a measure of covert prestige among native speakers that self-identify as Glaswegian (Braber 2009), rating highly in terms of social attractiveness traits (Torrance 2003: 43). Torrance (2003), for example, made use of a hybrid matched-guise experiment/subjective reaction test (N=16) with auditory stimuli consisting of 7 male and 7 female speakers, each of whom were recorded reading the stimuli in guises containing different concentrations of the phonetic variables /ʍ/, /ɫ/, /r/, and /θ/. Stimuli guises were intended to be broadly representative of several speech varieties spoken across the UK, including working-class Glaswegian and middle-class Glaswegian, Received Pronunciation (RP), as well as accents found in Edinburgh, Newcastle, Manchester, and London. All listeners were working-class Glaswegians who had spent most of their lives in Glasgow, and who were divided into older (over 30 years old) and younger (under 25 years old) age groups. Participants rated each speaker in terms of fourteen different traits falling under the broader categories of 'competence', 'integrity', and 'social attractiveness' (Torrance 2003: 42). The study found the RP guises to have been evaluated most favourably in terms of the competence traits among both the older and younger groups of listeners. The RP and Newcastle guises were also found to have been evaluated most favourably in terms of integrity traits among the older listeners (with the younger listeners showing no clear preference here). The Glaswegian speakers, however, were found to have been rated highest in terms of the social attractiveness traits among both groups of speakers. These results demonstrate that attitudes towards dialects are far more complex than can be accounted for simply by measuring on a simple positive versus negative bipolar continuum, as listeners can associate a host of different attributes, both positive and negative, with any given dialect.

Negative attitudes towards working-class Glaswegian appear to persist today, however, as indicated by a comment found on a news story[3] on Mhairi

[3] http://www.dailymail.co.uk/news/article-3073108/SNP-Mhairi-Black-youngest-MP-1667.html [accessed 15/06/15]

Figure 2.4: Comment on Mhairi Black's speech, from *The Mail Online*

Black, who had just given a speech after becoming the UK's youngest MP in 348 years (Figure 2.4). That the commenter 'knew she was a lout' as soon as they heard her speak strongly suggests that this opinion was formulated solely on her working-class Glaswegian accent. Certainly, the content of her acceptance speech appears to carry no such connotations, as the following excerpt demonstrates:

> I would like to thank all the other candidates for their participation and, in particular, whilst I appreciate that this is a blow for Douglas Alexander, I truly hope he will remain to see his future in politics once he has recovered from this result. I would like to thank my mum, my dad, my brother, my close friends for their continued support and all the help they've given me throughout this campaign. I want to thank the people of this constituency, for placing their faith in me, and for faith within the SNP. Whether you voted for the SNP or not, and whatever your views are on Scotland's future, I will seek to represent you and everyone in this constituency to the very best of my ability. This election is about making the voice of this constituency and the whole of Scotland heard more effectively at Westminster than ever before. I pledge to use this voice not just to improve Scotland, but to pursue progressive politics for the benefit of people across the UK.[4]

While anonymous internet comments cannot be taken as any measure of conclusive evidence, the popularity of the comment (with 30 *Mail Online*

[4]Mhairi Black's election victory speech: https://www.youtube.com/watch?v=iwz7uXl9OYU [accessed 15/06/15]

account holders having clicked the 'up arrow' in agreement, compared to 11 having clicked the 'down arrow' in disagreement) would appear to indicate that such opinions are not uncommon, or even unpopular, today. Furthermore, the informants in the numerous studies to have reported a stigmatized view of working-class Glaswegian speech range from middle-class university professors to working-class schoolchildren – suggesting that such views are pervasive throughout all levels of society (Macauley 1977; Menzies 1991).

In a more recent study, MacFarlane & Stuart-Smith (2012) utilized a matched-guise experiment (N=31) which tasked listeners with assigning both a working-class and middle-class guise (each containing phonetic variants typical of such varieties) to different researcher-created 'personas', consisting of separate groupings of working and middle-class associated brands. The study found that listeners were able to place both the working-class and middle-class guises into their corresponding 'personas' solely on the strength of the phonetic variants (/l/, /r/, and coda <er >) (MacFarlane & Stuart-Smith 2012: 11). This shows that both middle and working-class varieties of Glaswegian can be easily distinguished by native Glaswegian listeners to a highly significant degree ($p<.001$). This result is especially important for the current research as evidence of the implicit associations which people make towards both working-class and middle-class varieties of Glaswegian is dependent on the ability of native listeners to distinguish them.

2.5 Summary

Attitudes are affects for or against mentally-represented objects (Thurstone 1931). Self-reported attitudes can be unreliable, as they are affected by multiple factors such as the context of preceding information/questions, or question wording (Hippler & Schwarz 1986; Bickart 1992). The stability of an attitude is related to its strength (Krosnick & Smith 1994), which has a variety of dimensions that can be generalised to broad factors relating to how individuals view themselves and their level of commitment to the attitude (Pomerantz *et al* 1995).

With regards to language, ‘standardised’ speech varieties, such as RP, tend to be evaluated more favourably in terms of attributes relating to social status than non-standard regional speech varieties, whilst non-standard regional speech varieties tend to be evaluated more favourably in terms of social attractiveness attributes than ‘standardised’ language varieties (Cheyne 1970; Giles 1975; Smith 1979; Zahn & Hopper 1985; Preston 1999; Coupland & Bishop 2007). It would also appear that such evaluations are driven, at least in part, by socially-marked phonetic variation (Labov *et al* 2011). Listener perceptions of fine phonetic variation can be affected by visually-derived social information or prior conceptions of speakers (Strand & Johnson 1996; Niedzielksi 1999; Hay*et al* 2006; Koops *et al* 2008; Campbell-Kibler 2009). The social evaluation of speech may also be affected by the frequency of socially-marked phonetic variants in speech (Labov *et al* 2011).

With this in mind, a pilot sociolinguistic perception study was conducted in order to determine whether hearing speakers of different social accents would cause listeners to choose brand logos conveying differing socio-economic connotations.

Chapter 3

Pilot Study (MLitt)

3.1 Introduction

The current study developed from an initial pilot study carried out as part of a Master's dissertation (Robertson 2011) in which a first attempt was made to develop a methodology to investigate automatic social evaluations with regards to social accent. The rationale, design, method and results are repeated here in brief, by way of context for the research which was subsequently carried out in this PhD project.

The study centered around an experiment in which listeners were presented with various sets of images (with four images in each set, displayed in quadrants of a computer display) while pre-recorded instructions requested them to rate each image on accompanying (pencil and paper) questionnaires in terms of how strongly they associated them with a selection of target words. Image sets were compiled to include one 'working-class' image and one 'middle-class' image, each bearing semantic relationships to a corresponding target word in the auditory stimuli, and two semantically unrelated distractor images. 'Working class' and 'middle-class' categories for images were determined by hypothesis, taking class-stereotypical and socio-economic considerations into account. The experiment was carried out using a between subjects design, with twenty participants hearing instructions recorded from a working-class Glaswegian male, and the remaining half hearing the same instructions recorded from a middle-class Glaswegian male. As this was the only experimental condition to change, it was hypothesized that sufficiently varying responses between the two groups would indicate that speaker voice and accent had an effect on the implicit associations formed by listeners between the images shown and the target words heard. Conversely, a lack of variance between the responses made between the groups was thought to represent the null hypothesis that speaker accent did not impact upon the implicit associations made. Participant responses were not found to have varied by speaker heard, either descriptively or from statistical analysis. It seems likely that this was due to aspects of the experimental design, which were addressed over the course of the PhD study.

3.2 Method

3.2.1 Participants

The experiment was conducted with a total of 40 participants, 24 of which were male (60%), with 19 subjects living in Glasgow (47.5%) and the remaining 21 living in West Lothian. An opportunistic sample was taken, as a relatively large number of time consuming experiments (each lasting around 20 minutes in total) were required within a relatively short period of time, which also necessitated the recruitment of participants from both Glasgow and the neighbouring council district of West Lothian. The experiment was carried out between subjects, with half of the participants hearing a middle-class speaker and the remainder hearing a working-class speaker throughout. For each condition, three separate randomized orders of the visual and auditory stimuli were presented in order to control for fatigue effects.

The ages of the participants ranged between 18 and 67 years old (M=37.5, SD=10.8). The mean age of those who heard the middle-class speaker was slightly over 39 and a half years, with the mean age of those who had heard the working-class speaker being just under 36 years. While participant age was not controlled for, due to the need for a relatively large number of participants in a limited timeframe, care was taken to ensure subjects had no significant sight or hearing impairments. With regards to participant gender, 9 females and 11 males performed the experiment hearing the middle-class speaker, as opposed to the 7 females and 13 males who heard the working-class speaker. Of the participants who heard the middle-class speaker, 8 participants lived in Glasgow, as opposed to 12 living in West Lothian. The experiment containing audio taken from the working-class speaker, on the other hand, was completed by 11 Glasgow residents, and 9 people from West Lothian.

3.2.2 Materials

Auditory stimuli were recorded from one middle-class and one working-class Glaswegian male, who were both in their late 20s (29 and 26, respectively) and native to Glasgow. The middle-class speaker was a university lecturer known to the researcher, whereas the working-class speaker responded to an email requesting native, working-class Glaswegians, and was considered by the researcher to speak with an identifiably working-class accent. Each speaker was recorded reading the carrier sentence '*Please rate these images in accordance to how strongly you associate them with the word*', followed by each of the eleven priming words used in the experiment (*car, clothes, drink, food, game, job, knife, plant, ring, shop,* and *show*). The carrier sentence was intended to be semantically neutral, with no consideration given to phonetic features.

Each speaker was recorded reciting the carrier sentence in whole for each priming word. This was carried out to prevent the possibility of any inconsistencies which could have resulted from splicing the priming words with the carrier sentence from factoring in listener responses. While that the proximity of the priming words could have had an effect on listener associations (providing linguistic cues before the target word), this was not evident from participant responses (see 3.3). Each speaker was also recorded reading the phrase '*Where one is no association, and four is a strong association*' separately, which were later appended to each of their eleven sentences containing priming words, leaving a 500ms pause between the sentences in order to have them follow each other in a naturalistic sounding manner. Carrier sentences, and the appended instructional phrase, were deliberately chosen over single words in order to ensure that listeners had the opportunity to derive sociolinguistic information from each speaker's voice by providing numerous linguistic cues as to their sociolinguistic backgrounds.

Recording took place within the recording booth in the English Language department at the University of Glasgow, using a Sennheiser *MKH40P8* pressure gradient condenser microphone connected to a Digital Audio Workstation, which comprised a desktop PC running the program *Audacity*. All audio was recorded in mono at a sample rate of 44,100Hz. The recorded audio was then equalized in terms of overall amplitude using *Audacity*, with a peak of -12dB. Sections of many of the utterances recorded from the working-class speaker were also separately adjusted in terms of amplitude across certain words and phrases, as the speaker's voice tended to trail off over the course of each sentence. This had the effect of obscuring the priming words in many of his sentences in their unedited forms, but was compensated for by raising the amplitude in the latter sections of each utterance in proportion with the overall waveform. Care was taken not to increase the amplitudes of such sections over the -12dB peak, thus ensuring the edited utterances sounded as naturalistic as possible. Aside from the adjustment of amplitude, and the timing of the onsets of the two separate phrases in each utterance (which were preceded by silence in each case), no other manipulation was carried out on the audio samples. These alterations were made solely in the interests of presenting equivalent stimuli to participants throughout the experiments, and in attempting to ensure the utterances would be intelligible to participants. Visual stimuli consisted of 48 sets of 4 images (displayed in quadrants), with each set containing a 'working-class' and 'middle-class' target, both of which were semantically related to the priming word in the accompanying auditory stimuli for the set. These labels were applied as it was hypothesized that the 'working-class' target would be chosen more often when the working-class speaker was heard, with the reverse proving true for the 'middle-class' target and speaker. In each set, two semantically unrelated distractor images were

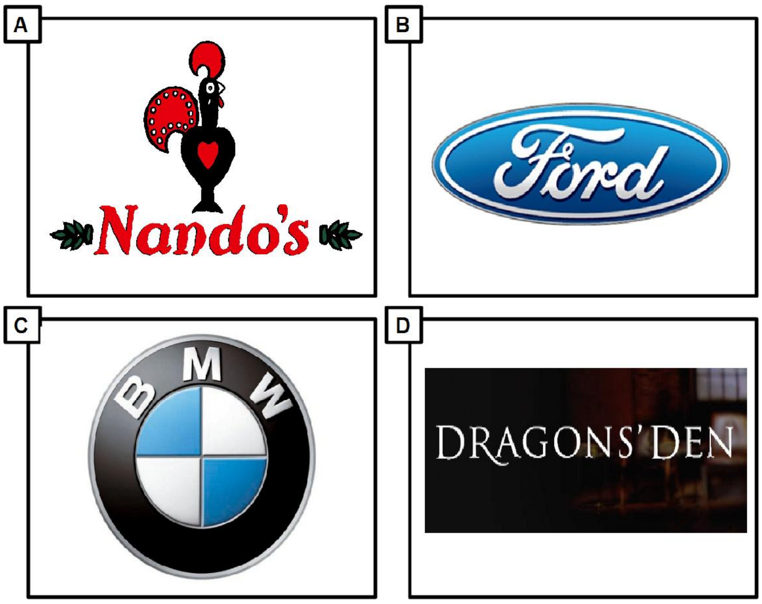


Figure 3.1: Image set displaying brand logos with working-class (Ford) and middle-class (BMW) target images, paired with the auditory target word *car* (pilot study)

also presented in randomized quadrants. Figure 3.1 illustrates one such set, with a brand logo hypothesized to be carry more middle-class connotations (BMW) and one hypothesized to carry more 'working-class' connotations (Ford) paired with auditory target word of *car*. Figure 3.2 shows a similar image set composed of depictions of objects. Here, it was hypothesized that participants would associate the image of the mortar board with academia (a more middle-class occupation) and the hairnet with a food-service job (a more stereotypically working-class occupation), giving target images with socially disparate connotations which are both semantically related to the auditory target word *job*. A total of 96 images were used, with each individual image appearing once as a target image and once as a distractor in order to control for salience effects, as exposing participants to some images more often than others may have affected responses (cf. Schneider & Shiffrin 1977). The visual stimuli for the experiment were divided into 24 sets containing brand logos, and 24 sets containing images of objects, as depicted in figures 3.1 and 3.2 (overleaf).

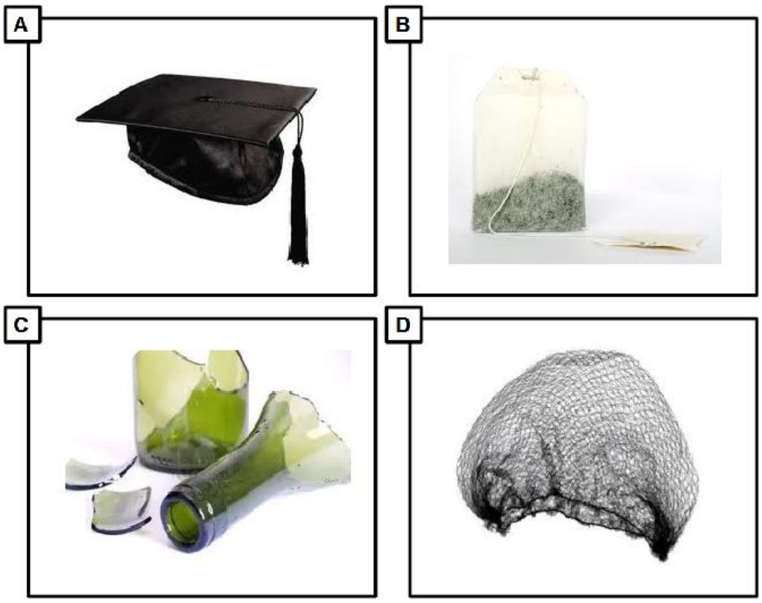


Figure 3.2: Image set displaying objects with working-class (hairnet) and middle-class (mortar board) target images, paired with the auditory target word *job* (pilot study)

3.2.3 Stimuli Norming

Image sets were normed in terms of semantic relation to their corresponding priming words by means of a task carried out via Amazon.com's *Mechanical Turk* service — a service which allows the completion of simple online tasks to be hired out to anonymous participants. For this, subjects were asked to rate each image (on a scale from one to four) depending on how strongly they associated them with the priming word related to the set, provided as text.

Variational analysis of the norming data revealed that 36 out of the 48 categories met the requirements of having:

1. No significant difference between the ratings of the two target images ($p<.05$)
2. No significant difference between the ratings of the two distractor images ($p<.05$)
3. Significantly higher ratings for both target images than for

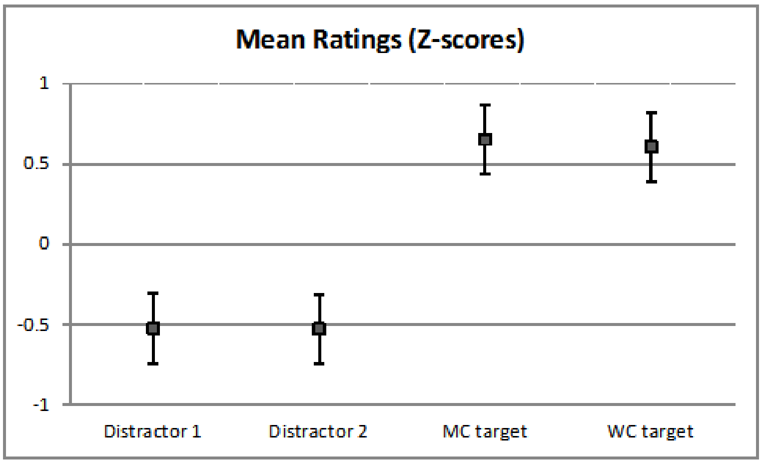


Figure 3.3: Mean ratings of reported written word-image associations in norming task, pilot study (z-scores)

both distractor images ($p<.05$)

As participants reported strong associations between the target images and priming words, and weak associations between the distractor images and priming words (figure 3.3), these 36 image sets were assumed to be semantically balanced. From this, it was also assumed that participants were able to readily identify the images in these image sets, reliably associating them with their corresponding target words. As a result of this, the remaining 12 image sets were excluded from analysis, but left in the main experiment as distractors.

3.2.4 Procedure

Participants were told they were being given a 'semantic association task' which would involve rating sets of images according to how strongly they associated each image with spoken words.

The task was then presented in the form of a Microsoft *Powerpoint* presentation, running on a laptop using Microsoft *Windows XP*. With the exception of the first and last slides of the presentation, which consisted of an introduction and a slide thanking participants, respectively, each slide displayed a different set of four images. Each image set was paired with an auditory token containing a recording of a word bearing semantic relationships with two of the images.

Auditory stimuli were presented via a pair of Sennheiser *HD 518* headphones, with stimuli programmed to trigger upon slide progression. It was originally intended that image sets be displayed for a total of 30 seconds before automatically progressing to the next slide, but it was discovered when the first participant was completing the experiment that this did not provide enough time for participants to mark their responses on the supplemental questionnaire. Due to this, automatic slide progressions were removed from the experiment, with each new slide instead being manually triggered by the researcher when subjects had rated all of the images in the preceding set. Experimental stimuli were presented in 8 different randomised orders (4 of which contained auditory stimuli recorded from the working-class speaker, and 4 containing audio recorded from the middle-class speaker) in order to control for possible fatigue effects. This gave a total of experimental 8 configurations in total, with each completed by 5 participants – 20 of whom heard only the middle-class speaker and 20 hearing only the working-class speaker throughout the task.

Participant responses were recorded in the form of pen-and-paper questionnaires, with subjects asked to rate each image in each set according to how strongly they associated them with the words heard in the auditory stimuli. It was initially hypothesised that comparing the responses gathered from these two groups of participants would reveal the implicit associations triggered by each speaker, with significant differences providing a preliminary indication of implicit sociolinguistic cognition.

3.3 Results

Statistical analyses were conducted upon the raw data with supervisory assistance. Analyses were conducted using linear mixed effects models (binomial distribution, logit link function) with raw image ratings and participant-specific z-scores as dependent variables. Speaker condition (middle-class vs. working-class), object (the middle-class, working-class, and distractor images

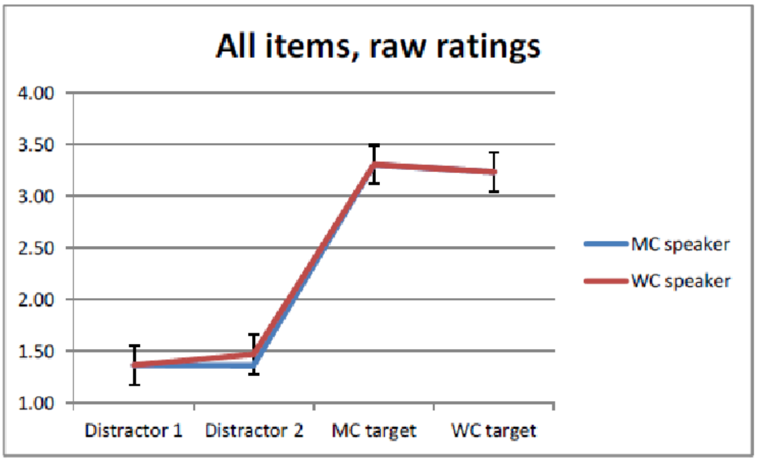


Figure 3.4: Mean ratings of associations between spoken words and target images across all image sets, by speaker (pilot study)

in each set), and the speaker condition x object interaction were utlized as fixed effects. Participant, image set, participant x object, and image set x object were included as crossed random effects (the latter two random interactions were important for generalization purposes, as they controlled for the fact that different participants and/or image sets might have produced slightly different object preferences). From these models, 95% confidence intervals around the means were derived.

The first set of analyses were carried out utilizing all 48 image sets, the second took only the 'best 36' (as identified by the norming task) into account, while an additional set of analyses examined image sets containing brand logos against those containing objects. Taking all 48 categories into account, including the 24 sets of brand logo images and 24 sets of object images, figure 3.4 shows a perfect replication of the results found from the norming task, in that the target images each received significantly stronger associational ratings than the distractor images. The social class of the speaker which participants heard, however, was found to have had virtually no effect on participant ratings here. This was also found to have been the case over the 36 categories which were determined to have been semantically balanced in the norming experiment (figure 3.3, p.49).

Finally, the categories containing brand logos and the categories com-

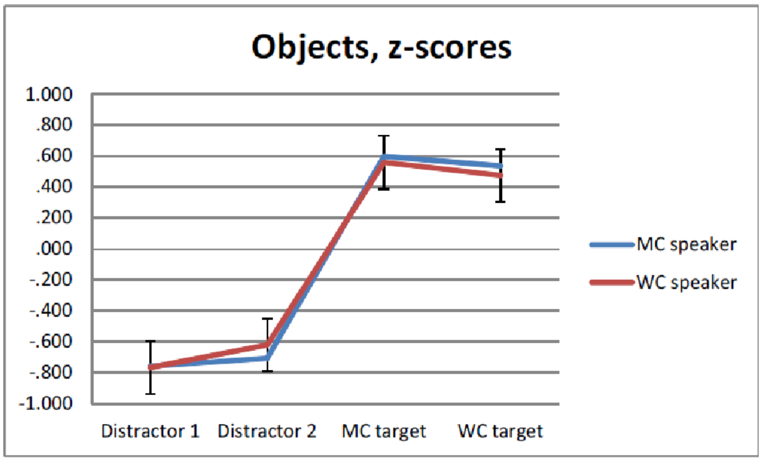


Figure 3.5: Mean ratings of associations between spoken words and target images in image sets depicting objects, by speaker (z-scores)

prised of images of objects were analysed separately in order to determine whether or not participants had reacted towards these in the same manner. Figure 3.5 and 3.6 show similar patterns to the previous analyses, in which the social class of the speaker heard by participants appears to have had virtually no effect on participant ratings of the visual stimuli.

When viewing image sets depicting objects, 2-tailed independent samples t-tests revealed no significant ($p>.6$) gender variance in listener ratings of either 'working-class' or 'middle-class' objects, regardless of which speaker listeners had heard. Listeners from Glasgow and those from West Lothian were also found not to have varied significantly ($p>.07$) in their reported associations between objects and target words, regardless of speaker heard. Listener associations between target words and 'middle-class' objects were found to positively correlate ($p=.03$) with listener age when hearing the working-class speaker, but no other significant ($p>.1$) effects of listener age were apparent.

When viewing image sets composed of brand logos, female listeners were found to have reported significantly ($p=.02$) stronger associations between target words and 'working-class' brand logos than male listeners while hearing the working-class speaker. Listener associations between target words and 'middle-class' brand logos while hearing the working-class speaker, however, were not found to vary significantly ($p=.1$). Similarly, while hearing

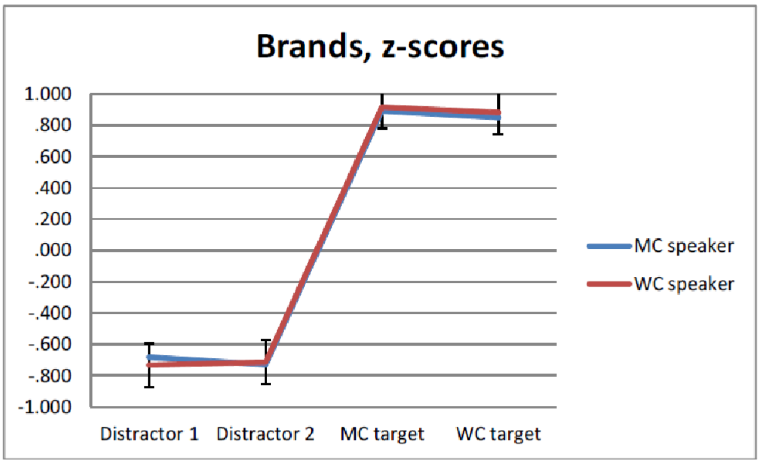


Figure 3.6: Mean ratings of associations between spoken words and target images in image sets depicting brand logos, by speaker (z-scores)

the middle-class speaker, male and female listener ratings of 'working-class' brands ($p=.7$) and 'middle-class' brands ($p=.7$) did not vary significantly under 2-tailed independent samples t-tests. Furthermore, the associations between target words and brand logos reported by listeners from Glasgow were not found to have differed significantly ($p>.3$) from those reported by listeners from West Lothian. No significant ($p>.06$) correlations between listener age and associative ratings of brand logos emerged, regardless of which speaker listeners heard.

3.4 Discussion

Although the results appear to show little to no effect of the social accent heard on the associations made by listeners, potential issues with the methodology were assumed to have prevented firm conclusions from being drawn from the experiment.

In line with Labov *et al*'s (2011: 457) theory of the sociolinguistic monitor, which posits that 'women generally show more negative reactions to deviations from overt linguistic norms', female listeners were found to have reported significantly ($p=.02$) stronger associations than male listeners between target words and 'working-class' brand logos while hearing the working-class speaker. Older listeners were also found to have reported significantly ($p=.03$) stronger associations between target words and 'middle-class' objects than younger listeners, but only while hearing the working-class speaker. While this may suggest that females and older listeners were more sensitive to the social information encoded in the working-class speaker's voice, these effects were not found elsewhere and no specific linguistic features were examined, making further inferences problematic.

It was evident from the completed questionnaires submitted by 4 participants that the instructions for rating image associations had been misinterpreted, in that they had assigned each image in each set a unique rank from 1 to 4 — rather than rating the strength of the associations made with each image on an individual basis. Incidentally, this was originally intended to be part of the experimental design, with images being ranked in relation to the other images in their respective sets. Due to difficulties encountered when attempting to program a rankings interface into HTML code for the online norming task, however, this method was abandoned in favour of the ratings scales utilised here. The receipt of four such surveys, each completed independently of the others, would appear to suggest that such a rankings system would have been more intuitive for participants, given that this happened in spite of instructions being given to rate (rather than rank) each image, both on the experimental questionnaire and repeated throughout the auditory stimuli. Using a ranking system to denote comparative associations between images and auditory priming words may also have been beneficial in that it would most likely have yielded greater differences between associative ratings throughout the experiment, as subjects would have been unable to apportion the same associative valence to any two images in a set.

Perhaps the most notable issue with the experiment, however, was that it was conducted 'offline', with no apparatus used to record real-time data on participant responses towards stimuli. Due to the pencil and paper format in which participant responses were subsequently recorded, it is impossible to determine whether the data collected reflect implicit associations, with established thresholds of implicit cognition ranging from 200-300ms (cf. Greenwald et al 1998; Payne 2001). Given that it took participants considerably longer than this to listen to the auditory stimuli and mark their responses on the scales provided, it is unlikely that this was the case.

Another potential issue was identified in participants hearing a single speaker throughout the experiment, which may have led listeners to focus solely on the semantic information presented in the auditory stimuli, making them to be less receptive to the social information encoded within the speech signal. In order to control for this potential effect, it was decided that future experiments should be designed to expose listeners to speakers with differing social accents.

Despite these methodological issues, the experiment served as an invaluable pilot study, identifying areas to address in the current thesis. That participants reported strong associations between the priming words and semantically related target images, and weak associations with the distractor images, suggested that the categories used in the visual stimuli were sufficiently balanced for use in future experiments. As the data show little effect of speaker voice on the (ostensibly explicit) associations reported by listeners throughout the course of the experiment, these results provide a valuable comparison to the real-time eye tracking data subsequently carried out.

Chapter 4

Experiment 1 - Off-line Semantic Association Task

4.1 Introduction

As a precursor to working with eye tracking data, it was decided that another off-line pilot study should be carried out in order to test whether different speaker accents could influence listener associations between words and images. In contrast with the previous experiment, listeners were instead tasked with choosing an image in each set rather than rating them individually (abandoning considerations of a ranking system in favour of a simpler design), according to the target words heard in the auditory stimuli. As this required a different set of instructions from the previous experiment, new auditory stimuli were recorded from both a working-class and a middle-class Glaswegian male, and distractor tokens recorded from two Glaswegian females. In keeping with the new forced-choice design, the auditory instructions for the task were changed to '*Please choose the picture you most strongly associate with the word* [target word]'. It was hypothesised that hearing speakers of differing social accents would elicit differing image choices in listeners.

4.2 Method

4.2.1 Participants

The experiment was conducted with 32 participants, comprising 21 males (65.6%) and 11 females, with ages ranging from 18 to 63 years old (M=28, SD=13.3). Participation was open only to native Glaswegians, who had been born and lived all of their lives in the Greater Glasgow area, in order to avoid potential regional biases and ensure that listeners were able to recognise the social accents in the auditory stimuli. Due to the difficulty in obtaining a sufficient number of participants with the regional/native restriction in place, participant age and gender were not controlled for.

4.2.2 Materials

Auditory Stimuli

Auditory stimuli were recorded from different speakers than the pilot study, consisting of a 27 year old working-class Glaswegian male and a 25 year old middle-class Glaswegian male. This was necessary due to the change in experimental design, with the auditory stimuli used in the previous experiment containing instructions to rate, rather than choose, images. Distractor stimuli was recorded from a 22 year old working-class Glaswegian female and a 24 year old working-class Glaswegian Asian female. Recording took place within a sound-attenuated recording booth within the English Language department at the University of Glasgow, using a Sennheiser *MKH40P8* pressure gradient condenser microphone connected to a Digital Audio Workstation, which comprised a desktop PC running *Audacity*. All audio was recorded in mono at a sample rate of 44,100Hz, and normalized to +10dB in order to remove changes in amplitude across stimuli items. As the purpose of the experiment was to investigate the effects of social accents on listener associations, it was decided to only analyse the associations participants made upon being presented with image sets accompanied by the male speakers, and include the female speakers as distractor voices (in order to control for the effects of gender and ethnicity on listener perceptions). Each speaker was recorded uttering the semantically neutral carrier sentence *'Please choose the picture you associate most with the word...'*, followed by each of the target words – *car, clothes, drink, food, game, job, knife, plant, ring, shop*, and *show.* These were presented to participants via headphones, alongside corresponding visual stimuli.

Visual Stimuli

Visual stimuli were comprised of the same image sets composed and normed for the pilot study, with an additional 48 image sets serving as distractors. As before, each image set was comprised of four images (with an image displayed in each quadrant of a computer screen), with two of those images bearing different semantic relations to the corresponding priming word for each set, and two semantically unrelated distractor images (figure 4.1). These target images were placed in pseudo-randomised locations across trials. Target images were chosen on the basis that one would be more readily associated with working-class speakers, while the other would be more readily associated with middle-class speakers. This hypothesis was formulated with consideration to differing socio-economic associations with working and middle-class speakers in Glasgow, with images chosen to depict class-typical items of clothing, for example, and objects with varying associations with violent behaviour and 'toughness' (cf. Lawson 2011).

Visual stimuli were split between 24 image sets containing pictures of objects (as in figure 4.1), and 24 image sets containing brand logos (as in figure 4,2). For example, one of the image sets containing objects was comprised of pictures of a gun, a spoon, a teapot, and a pair of trainers.

When this image set was displayed to participants, listeners heard a speaker utter the sentence *'Please choose the picture you most strongly associate with the word knife'.* Following the design of Payne (2001), it was calculated that choosing the image of the gun would indicate that listeners associated the word 'knife' with its sense as a weapon, whereas choosing the image of the spoon would indicate that listeners associated the target word more with its sense as a utensil. This led to the hypothesis that listeners

Figure 4.1: An image set depicting objects, showing images hypothesized to carry 'working-class' (the gun) and 'middle-class' (the spoon) connotations, based on ratings from a norming task (Experiment 1)

hearing the working-class speaker would associate the priming word more often with the gun than the spoon when this image set was displayed, with the reverse being the case for those hearing the middle-class speaker.

Here, it was thought that the logo for the *Scottish Football Association* (paired with the target word *game*) would be more readily associated with the working-class speaker, as the sport has a predominantly working-class following in Britain (Cashmore 2010: 236). Conversely, it was thought that the logo for *Scottish Rugby* would be more readily associated with the middle-class speaker as, with the notable exception of Wales, the sport has traditionally been associated with middle-class, public-school educated men in Britain (Cashmore 2010: 225). Similar reasoning was applied when generating the 23 other image sets containing objects, and 23 other sets comprised of brand logos, before the visual stimuli were tested both for the strength of the associations which people felt between the target images and target words (achieved via a separate norming task, conducted using Amazon's *Mechanical Turk* service (p.50), and for any inherent social connotations which the

Figure 4.2: An image set containing brand logos, showing images hypothesized to carry 'working-class' (*The Scottish Football Association*) and 'middle-class' (*Scottish Rugby*) connotations, based on ratings from a norming task (Experiment 1)

images used held, determined through the responses collected from a social evaluation questionnaire (N=32).

Stimuli Norming : A social evaluation questionnaire was conducted prior to the experiment among a separate group of 32 native Glaswegians, who provided associative ratings of each image used in the experimental stimuli on 5-point semantic differential scales, with 'neddy' (a Glaswegian colloquialism relating to Glasgow's socio-economic underclass, cf. Lawson 2011) at one end and 'posh' on the other (Appendix 1, p.212). These informal terms, locally-relevant terms were chosen in order to reflect a sharp contrast in social class that may not have been apparent with standard 'working-class' and 'middle-class' labels, and to avoid using social-science specific terms such as 'underclass' which are not in use among the general public.

The results from the image norming task were converted to numerical data and z-transformed, before it was decided that only sets where the target images were 2 measures of relative distance apart should be considered as having sufficiently varying social connotations. Of the 48 original (non-distractor) image sets, 28 image sets passed this criteria.

4.2.3 Procedure

The experiment was presented to participants via a Microsoft *Powerpoint* presentation, running on desktop computers supplied with sets of Sennheiser *HD 518* headphones outputting audio through M-Audio *USB Fasttrack* external soundcards. Two computers with identical setups were used in order to run the experiment with multiple participants at once, with all testing conducted in University of Glasgow's Experimental Phonetics Laboratory. Each presentation consisted of slides containing the visual stimuli, with the corresponding auditory stimuli for each image set embedded and cued to play upon slide progression. Four different presentations, showing the same stimuli in different randomized orders, were utilized in order to control for possible fatigue effects. Unlike the previous experiment, participants were asked to choose only one image in each set. Although each listener was presented with auditory stimuli from all four speakers recorded, the experiment was carried out between subjects. Half of the subjects were presented with certain image sets accompanied by audio from the working-class male and other image sets while hearing the middle-class male, while the other participants saw the same image sets with the order of the speakers heard reversed.[1]. Participants were also presented with distractor image sets paired with auditory tokens recorded from the female speakers. Responses were recorded via questionnaires, which were completed during the experiment. Listeners were given a total of seven seconds to indicate which image in each set they most strongly associated with the corresponding target words, hearing one instance of auditory stimuli with each image set.

[1]For example, where one group of participants were presented with image sets 1, 3, and 5 while hearing the middle-class speaker, a second group were given image sets 1, 3, and 5 while hearing the working-class speaker. Conversely, the first group were given image sets 2, 4, and 6 while hearing the working-class speaker, whereas the second group heard the middle-class speaker during these image sets

4.3 Results

Instances in which listeners had selected distractor images were excluded from analyses, as these were found to have occurred in negligible proportions (3.9% of total trials).

Participant responses to the image sets containing brand logos were analysed both together with and separately from the image sets containing objects. The results here show the separate analyses of brand logo and object images sets, as these were found to have patterned in opposing directions. This may have been due to differences in semantic associations made towards objects and brand logos — for example, when viewing image sets containing objects, participants were tasked with selecting an object semantically related by function to the target word, whereas the brand logos were hyponymously related to the target words (e.g. a gun or a spoon can be used for similar purposes as a 'knife', whereas Waitrose and Tesco are both types of 'shop'). The data collected from participant responses to the brand logos showed that listeners were marginally more likely to choose the image of the brand hypothesised to be more associated with working-class speakers when the target words were heard from either the middle-class speaker (52%) or the working-class speaker (52%), indicating a slight trend in favour of the 'working-class images' regardless of the speaker heard (Figure 4.3).

With regards to the image sets containing objects, the reverse was found with listeners found to have chosen the 'middle-class objects' more often than the 'working-class' objects regardless of speaker heard (Figure 4.4).

Nevertheless, these results were not found to be statistically significant ($p>.4$ in each case) under linear mixed effects model (binomial distribution, logit link function), including speaker condition (middle-class vs. working-class), object (the middle-class, working-class, and distractor images in each set), and the speaker condition x object interactions as fixed effects. Participant, image set, participant x object, and image set x object were included as crossed random effects.

Under 2-tailed independent samples t-tests, female listeners were found to have selected marginally more working-class brand logos when hearing

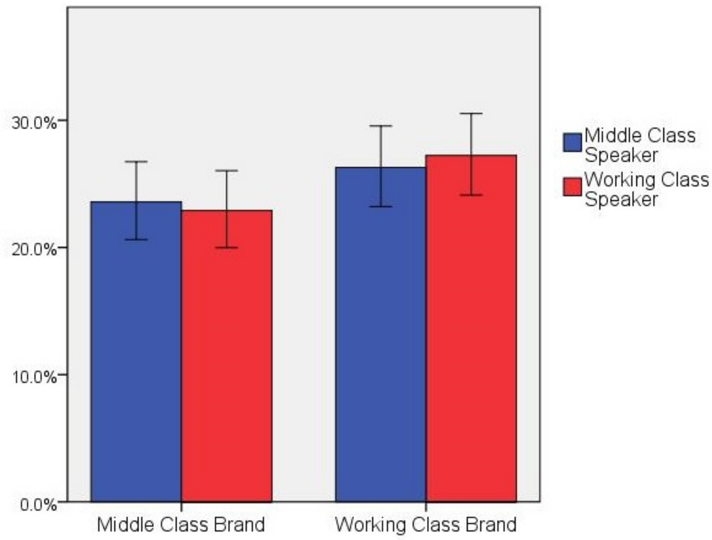


Figure 4.3: Listener choices of brand logos by speaker heard, Experiment 1 (95% C.I.)

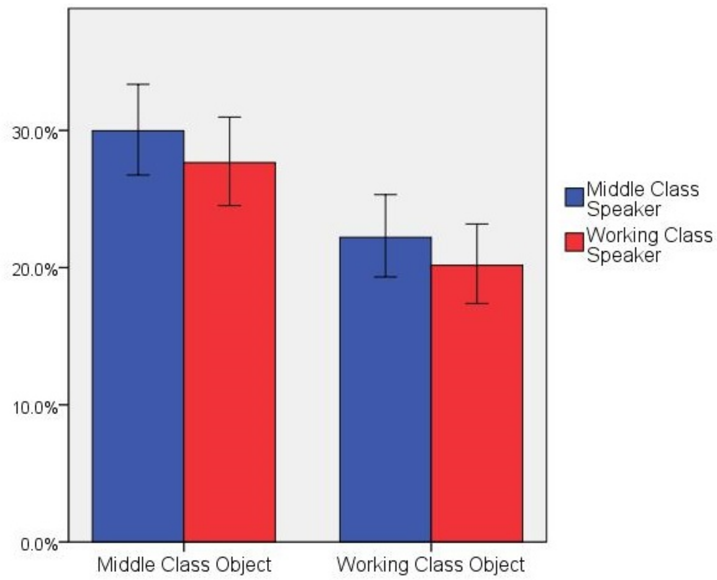


Figure 4.4: Listener choices of objects by speaker heard, Experiment 1 (95% C.I.)

a middle-class speaker and more middle-class brand logos while hearing a working-class speaker (showing a class-incongruent trend). Male listeners were found to have selected marginally more working-class brand logos while hearing a working-class speaker and more middle-class targets while hearing a middle-class speaker (class-congruent trend). All gender variances, however, were non-significant ($p>.05$). Similarly, no significant ($p>.25$) correlations were found between listener ages and choices of either objects or brand logos, regardless of speaker heard.[2]

4.4 Discussion

While statistical analyses did not reveal a significant impact of speaker voice on the images chosen by listeners, the results of this experiment show clear trends in the directions hypothesized – with listeners more likely to choose a ‘middle-class’ image when the middle-class speaker was heard, and a ‘working-class’ image when the working-class speaker was heard. The experiment also revealed that people were more likely to choose the ‘working-class’ brand logos and ‘middle-class’ objects regardless of speaker heard. This may be due to the more ubiquitous nature of brand logos considered working-class, and the less commonly used nature of some of the objects used as ‘working-class’ examples here. For example, Tesco has a far larger market share and number of stores that Waitrose (with which it was paired in the experiment), so would presumably be far more likely to trigger associations. Likewise, it may have been the case that some of the objects chosen for the ‘working-class’ images, such as nuchakus and knuckledusters for the word ‘knife’, are less commonly encountered than their ‘middle-class’ counterparts, such as scissors and cake slices. As participants were exposed to the same stimuli in both speaker conditions, however, such salience effects are not of primary concern. While the trends in listener image choices appear unusual, the non-significant variance in listener image choices indicates that any effect of speaker voice was minimal. Furthermore, no significant

[2] 2-tailed Pearson correlations

($p > .05$) differences were found between male and female listeners' choices of either brand logos or objects, and little correlation ($p > .25$) was found between participant choices of brands and objects, regardless of speaker heard. This methodology, however, did not record real-time data so cannot be used to infer implicit associations. In order to investigate this, a near-replication of this experiment was formulated, monitoring listener fixation behaviour in real-time via an eye tracking headset (Ch. 6)

Chapter 5

Background II

5.1 Implicit Cognition

For the past three decades, psychological research has repeatedly shown that it is not always necessary for us to be conscious of events in order to perceive them, with the evidence suggesting that 'the recognition of simple stimuli can be achieved without attention, and even without awareness' (Underwood & Bright 1996: 1). This phenomenon is referred to as implicit cognition, and operates on the basis that 'Awareness of an event is neither a necessary consequence of cognition nor a necessary condition for cognition' (Underwood & Bright 1996: 3).

Implicit cognition experiments in psychology have traditionally utilised methods such as semantic priming, in which stimuli are presented to participants under subliminal conditions, below what is considered to be the threshold of conscious awareness. This, for example, may involve words or images being displayed for tens of milliseconds before being replaced by a backwards (or pattern) mask in the form of a second stimulus, often consisting of a random display of letter-like features, dots, or other non-linguistic features (Underwood & Bright 1996: 3).

Early semantic priming experiments involved first determining the critical stimulus-onset-asynchrony (SOA)[1] levels at which participants could not

[1]SOA: The amount of time between the onset of one stimulus item and the onset of

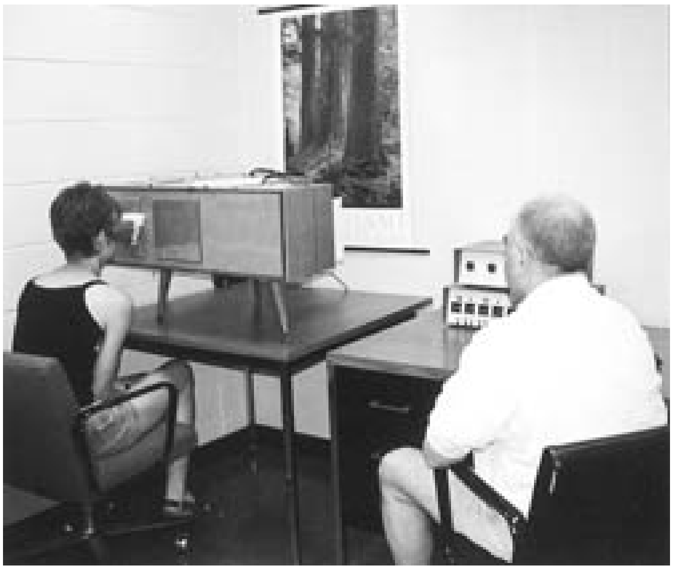


Figure 5.1: A research participant viewing images on a tachistoscope

explicitly identify stimulus items, before presenting stimulus items at a lower SOA. Fowler *et al* (1981) utilised the semantic priming method in a series of experiments which tasked participants with identifying words presented to both eyes on a tachistoscope (figure 5.1)[2], across trials which consisted of cards (with 50% blank and 50% containing words) flashing momentarily inside the tachistoscope before being replaced by a pattern mask. Two such experiments (N=20 and N=10) found masked words to have facilitated 'lexical decisions concerning subsequently presented semantically related words' as effectively as unmasked words (Fowler *et al* 1981: 341).

Similarly, Balota (1983) conducted an experiment (N=24) investigating the influence of a masked prime on subjects' lexical decisions. After determining each subject's critical SOA threshold in identifying whether words were present on tachistoscope-displayed cards or not, participants were subject to 64 trials involving priming words and 64 trials containing non-words. Primes were momentarily displayed to participants' non-dominant eyes before disappearing, with a pattern mask being simultaneously presented to their domi-

another, with the second stimulus item ordinarily being a pattern mask.

[2]Image taken from the York University (Canada) website: http://www.yorku.ca/yul/gazette/past/archive/2000/022300/issue.htm [26/06/15]

nant eyes. Participants were then given a choice between two target words in a lexical decision task, where 'primes were either related (GRAPE), neutral (XXXXX), or unrelated (BOX) to the targets (JAM)' (Balota 1983: 88). The experiment found subjects to have responded faster to targets which followed semantically related primes than to targets which followed semantically unrelated primes, with 'subjects being unable to reliably report the presence of the prime' (Balota 1983: 88).

Also using a tachistoscope, Marcel (1983) utilised a similar methodology to Balota (1983), presenting participants with a priming stimulus in their non-dominant eye, followed by a patterned mask in their dominant eye. In his first experiment (N=24) cards were momentarily shown to participants, with 50% being blank and 50% containing words. Over 480 trials, participants were tasked with deciding if a word was present and, if so, choosing a semantically similar term from a choice of two target words, then a graphically similar word from a choice of another two target words, each pre-tested for similarity using pre-existing norms (Bousfield *et al* 1960; Postman & Keppel 1970; Weber 1970). SOA was lowered for each participant as the experiment continued, with participants found to have first reached chance performance level (making correct decisions in 50% of trials) first in detecting words, then in choosing graphically similar words, and finally in choosing semantically similar words, suggesting that unconscious processing time varies for different types of information.

It should be noted, however, that the semantic priming method as utilised by Fowler *et al* (1981), Balota (1983), and Marcel (1983) has been criticized for relying on verbal participant reports to determine whether stimuli are subliminal or not. As Underwood & Bright (1996: 4) state: 'this objective measure does not necessarily match with subjective impressions. The perceiver may be unable to identify a word well enough for verbal report while still knowing something of the presentation.'

Other studies, such as Cheesman & Merikle (1984), addressed this by examining implicit cognition using objective thresholds, determined by participant ability in 'making discriminative responses regardless of their verbal reports of discriminability.' (Underwood & Bright 1996: 4). In their experiment (N=8), Cheesman & Merikle (1984: 388) performed a series of stroop test[3] variants, in which participants were tasked with fixating on colour patches within a tachistoscope and naming the colour as quickly as possible. Colour patches were accompanied by either one of four congruent colour words (e.g. *blue* when viewing a blue colour patch), an incongruent colour word (e.g. *yellow* when viewing a blue colour patch), or a control letter string (e.g. *XXXXX* when viewing a blue colour patch) appearing either above or below the patch. The colour patch and stimulus were then obscured by a pattern mask, and participants were then tasked with identifying the colour of the patch seen during the trial from a choice of four colours.

Cheesman & Merikle (1984) then determined each participant's objective SOA threshold in identifying priming words during a preliminary block of trials in which SOA was reduced until participants reached 25% accuracy levels. In a subsequent block of trials, participants were instructed to identify colour blocks but 'to avoid naming any letter strings that might appear above or below the colour patch' (Cheesman & Merikle 1984: 389). The experiment found stimulus words presented at the objective SOA thresholds to have had no effect on participant performance in identifying the colour of simultaneously presented colour patches. Furthermore, all participants 'claimed they could not see anything at durations that were 30 to 50ms above their objective thresholds' (Cheesman & Merikle 1984: 390).

In a second experiment (N=10), both the objective and subjective thresholds for each participant were established before priming trials were carried out. As before, participants were given a four-option forced-choice colour word naming task. Objective thresholds were determined by finding the SOA for each participant at which priming words could only be correctly identified at chance (25%) accuracy levels, whereas subjective thresholds were defined as 'the actual observed performance when subjects initially estimated

[3]Stroop tests task participants with reading aloud or categorising the written names of colours while the text itself is displayed in non-matching colours (e.g. **red**, blue, or **yellow**), and in naming the colours of solidly-coloured blocks in a control condition. Interference is expressed as the total difference in participant response times between correctly naming the colours represented by the text and in naming the colours of the control blocks (MacLeod 1991).

that their detection performance was less than 30% correct.' (Cheesman & Merikle 1984: 392). For this experiment, stimuli were presented over computer display, rather than via tachistoscope, using a hood to physically divide the screen into two separate (left eye and right eye) sections. Participants entered choices via a connected button box, which was also used to initiate trials. All subjects were found to have identified colour words with high accuracy levels (between 53% and 75%) at the subjective threshold, at SOAs where they claimed not to be able to determine colour words with better than chance accuracy. At the objective threshold, however, participants were found to only have correctly identified primes with a mean accuracy of 27%. Cheesman & Merikle (1984: 394) argue that the absence of a priming effect in the objective threshold condition and presence of a pronounced effect in the subjective threshold condition demonstrates the need for both thresholds in implicit cognition research, in order to distinguish between 'perceptual sensitivity' and 'a lack of confidence that a particular stimulus has been presented', but conclude that:

> The results thus support Eriksen's (1960) position that verbal reports are an accurate indicator of perceptual processing and contradict recent claims that masked primes presented below the awareness threshold are nevertheless perceived.
> (Cheesman & Merikle 1984: 395)

Building upon this, a further study by Reingold & Merikle (1988) proposed an approach involving a comparison between direct measures (explicit responses, such as verbal reports) and indirect measures (implicit performance, or changes in discrimination performance unavailable for report), reasoning that a discrepancy between explicit and implicit reactions within subjects would provide proof of the unconscious processing of subliminal primes. In an experiment (N=40) conducted to test this approach, participants were simultaneously presented with words and non-words over two sets of 144 trials. Stimuli were presented to both eyes via computer display, with a hood physically dividing the left-eye and right-eye fields, and participant responses gathered via touch-sensitive plates positioned before the display screen. In one set of trials, participants were tasked with deciding which of the two display fields (left or right) contained a word (with the other containing a non-word). In a second set of trials, participants were tasked with deciding which stimulus item (left or right) was displayed for a longer duration than the other. Participants were found to have performed significantly ($p<.01$) better than chance in identifying words from non-words. In the other set of trials, the presence of words versus non-words was not found to have significantly ($p>.05$) influenced participant judgements of stimuli durations. Furthermore, a cross-condition 2x2 analysis of variance found a significant ($p<.05$) effect of task, showing participants to have performed significantly better during the lexical decision task than during the duration judgement task — a finding which Reingold & Merikle (1988: 571) claim 'provide[s] strong support for the conclusion that the direct measure of lexical status has greater absolute sensitivity than the comparable indirect duration judgment measure.'

In a further experiment ($N=20$) conducted under similar experimental conditions, Reingold & Merikle (1988: 572) informed participants that they would see two 'flashes', tasking participants with deciding 'which flash contained a string of letters' or, in a separate condition, 'which flash was longer in duration'. Stimuli in each condition consisted of a randomly selected word or non-word presented to one eye while a blank field was simultaneously presented to the other. Subjects were found to have performed at significantly better than chance levels both in detecting words and non-words ($p<.001$) and in determining which stimuli had the greater duration ($p<.01$). An additional analysis of variance found a significant ($p<.001$) main effect between conditions, supporting the findings of the previous experiment — that direct measures, such as the perceived presence of letter strings, provide 'a more sensitive index of perception than does a comparable indirect measure', such as the perceived duration of stimuli (Reingold & Merikle 1988: 572).

It is Reingold & Merikle's (1988) approach of comparing direct and indirect responses that has been largely adopted across the domain of social psychology, where implicit cognition has been under research for over twenty years, repeatedly showing individuals to make automatic evaluations upon encountering 'attitude objects' (Castelli *et al* 2004: 373).

5.2 Implicit Social Cognition

The enormity of the social implications of automatic evaluations is perhaps best outlined by Payne & Gawronski (2010: 1), who assert that 'Within the space of the last two decades, virtually every intellectual question in social psychology, and many outside of it, has been shaped by the theories and methods of implicit social cognition.' Numerous studies have examined implicit evaluations with regards to a range of different social groups, using measures such as the affective priming procedure (Fazio *et al* 1986; Klauer & Wegener 1998) and the Implicit Association Test (Greenwald *et al* 1998), with results consistently showing that people are quicker to associate negative traits with members of socially stigmatised groups than with members of groups which are less stigmatised (Greenwald *et al* 1998; Payne 2001). Such research has shown that associations can occur below the level of conscious awareness, with unconscious associations believed to be triggered via automatic attitude activation. Fazio (2001: 115) explains this process in the following terms: 'presentation of an attitude object has been shown to automatically activate from memory the evaluation that an individual associates with the object.'

5.2.1 Social Priming

Research on implicit social cognition draws upon early priming studies, such as those carried out by Schneider & Shiffrin (1977), who conducted a series of experiments which involved tasking participants with identifying target letters in rapidly-displayed letter strings presented via tachistocope, across blocks of trials with changing targets between trials. The study found participants to have identified target letters faster (with participants reporting the target letters 'popping out') when those letters had not been previously seen as distractors in other trials. From this, and similar experiments, Schneider & Shiffrin (1977) formulated a theory of automatic detection versus controlled search processes.

Later priming experiments, such as Fazio *et al* (1986), used the affective priming procedure. In the first such experiment (N=22), subjects were positioned in front of an *Apple II+* computer and tasked with categorising a series of on-screen 'attitude objects' (words including the names of individuals, animals, foods, social groups, nations, activities, and physical objects) as either good or bad, using labelled keys on a keyboard. Participants were instructed to perform this task as quickly and as accurately as possible, with responses and response times recorded. From their performance, words were selected on the basis of participants having responded to them quickest in categorising them as good, quickest in categorising them as bad, slowest in categorising them as good, and slowest in categorising them in bad — or, as Fazio *et al* (1986: 231) termed these categories, '*strong good, strong bad, weak good,* and *weak bad.*' Participants were given a series of trials in which they were shown primes consisting of the selected words (or a string of identical letters) for 200ms, followed by a 100ms interval, before being shown an adjective (with either positive or negative connotations) and tasked with categorising the adjective as either good or bad, while also being asked to recite the on-screen primes, or 'memory words', which they saw. Compared to other conditions, participants were found to have been significantly ($p<.001$) quicker in categorising positive adjectives as good when shown a priming word they had previously been quick to rate as good (or a *strong good* word), and significantly ($p<.001$) quicker in categorising negative adjectives as bad when shown a priming word they had previously been quick to categorise as bad (or a *strong bad* word). Weak primes (*weak good* and *weak bad* words), on the other hand, were found not to have facilitated faster adjective categorisations. Valence incongruent (i.e. a *strong good* prime presented before a negatively valenced adjective) trials were found to have produced an inhibitory effect, with participants slower in categorising the adjectives in these. As Fazio *et al* (1986: 233) state, the results show that 'at least some attitudes may be activated from memory automatically upon mere presentation of the attitude object.'

In a later study, Fazio *et al* (1995) made use of the affective priming procedure to briefly show (N=53) participants on-screen photographs of people of different races (for a duration of 315ms, followed by a 135ms interval), before displaying either positively or negatively valenced adjectives. Participants were tasked with categorising the adjectives as either positive or negative, with input recorded via keyboard. Among white participants (N=45), pictures of white faces were found to have facilitated quicker positive categorisations, and pictures of black faces faster negative categorisations. Conversely, among black participants (N=8), pictures of white faces were found to have facilitated quicker negative categorisations, and pictures of black faces faster positive categorisations.

Priming effects were also demonstrated in two experiments conducted by Bargh *et al* (1996), the first of which (N=34) found participants who had been exposed to scrambled sentences containing words semantically related to the concept of 'rudeness' (such as *aggressively, bother, disturb*, and *interrupt*) to have interrupted the experimenter significantly (p=.008) quicker than participants who had either been exposed to scrambled sentences containing words semantically related to the concept of 'politeness' (such as *respect, patiently, polite*, and *unobtrusively*), or scrambled sentences containing words intended to be semantically neutral (such as *normally, optimistically, clears*, and *prepares*). The second such experiment (N=30) presented participants with scrambled sentences containing either words related to an 'elderly stereotype' (such as *old, grey, wise*, and *retired*) or a neutral stereotype which contained 'age-non-specific words in the place of elderly stereotyped words.' (Bargh *et al* 1996: 237), before a second experimenter recorded the amount of time they took to walk down a corridor after exiting the laboratory. The study was then replicated with a further 30 participants. In both cases, those who were subjected to the scrambled 'elderly stereotype' words took significantly (p<.01 and p<.05, respectively) longer to walk down the hall than participants that were not, suggesting that the passive activation of the elderly stereotype was responsible for their slower walking pace.

Dijksterhuis & van Knippenberg (1998: 865) conducted four experiments investigating the performance of college students in general knowledge tests after being primed with either 'intelligent' or 'stupid' stereotypes. In the first such experiment (N=60), undergraduate students were first told to imagine and list the traits of either a typical university professor (in one condition), or a typical secretary (in a control condition). Another group of participants were given no prime, with participants being randomly assigned to one of the three experimental conditions. These occupations were chosen after a prior norming task (N=40), which had participants rate various occupations in terms of 56 traits on 9-point scales, with professors found to have been perceived as intelligent (with a mean rating of 7.78) and knowledgeable (7.56), and secretaries found to have been rated near the mid point for these attributes (5.05 and 4.83, respectively). Participants were then given a general knowledge test consisting of 42 multiple-choice questions (drawn from the game *Trivial Pursuit*), each with four choice options, and told that 'the Personality Department was currently developing a "general knowledge" scale' with subscales ranging from *very easy(1)* to *very difficult (5)*, and that the experiment was 'testing the differences in difficulty between each scale' (Dijksterhuis & van Knippenberg 1998: 869). Participants in the 'professor' condition were found to have performed significantly better in the test than those in the 'secretary' ($p<.003$) or no-prime ($p<.02$) conditions.

A second experiment (N=58) attempted to replicate the first, varying the length of time participants were exposed to both primes and questions (shown on an *Apple Macintosh LCIII* computer display). Primed subjects were shown a 'professor' prime, with some given a 2 minute prime condition and others a 9 minute prime condition. One third of the subjects were apportioned to a no-prime control group. Subjects were subsequently given the same instructions and general knowledge test as in the first experiment, with the addition of 18 new questions. A time limit was also introduced, with each question displayed on screen for 15 seconds. Participants who had been primed for 9 minutes were found to have performed significantly better in the test than those primed for 2 minutes ($p<.05$) and those not primed at all ($p<.001$). Participants who had been primed for 2 minutes were also found to have performed significantly ($p<.04$) than those in the no-prime condition.

In a third experiment (N=95), Dijksterhuis & van Knippenberg (1998) replicated the second experiment, but replaced the 'professor' prime condition with a 'soccer hooligan' prime condition — in which participants were asked to imagine and list the attributes of a typical football hooligan, a group which participants in a prior norming task (N=40) had rated low in terms of intelligence and knowledgeability (with mean ratings of 2.12 and 1.98 out of 9, respectively). Participants given a 9 minute 'soccer hooligan' priming task were found to have performed significantly worse in the general knowledge test than those given a 2 minute 'soccer hooligan' priming task ($p<.05$) and those in a no-prime control condition ($p<.003$). In a fourth and final experiment (N=43), participants were primed either with a stereotype ('professor' or 'soccer hooligan') or with an associated trait ('intelligent' or 'stupid'), with those in the trait conditions being instructed to think about the concept of that trait. Participants primed with either the 'professor' or 'intelligent' traits were found to have peformed significantly ($p<.02$) than those in the 'soccer hooligan' and 'stupid' conditions. These findings, however, and those of Bargh *et al* (1996), are not without controversy (see section 2.4.2).

Payne (2001) utilised an affective priming procedure in two experiments, the first of which (N=31) consisted of a series of trials which involved exposing white subjects to an image of a human face (a black face on some trials, a white face on others), which flashed on-screen before momentarily being replaced with either a gun or a 'harmless' hand tool, which in turn was replaced with an irregularly patterned black and white visual mask. Participants were then tasked with ignoring the faces while categorising the objects as either guns or tools, with their reaction times being recorded in each case. Response time comparisons across conditions revealed participants to have been significantly ($p<.001$) quicker to identify guns when primed by a black face than when a whte face was shown, and significantly ($p<.02$) quicker in identifying tools when primed by a white face than when a black face was shown. A second experiment (N=32) was conducted as a direct replication of the first with a new set of participants (all white college students), with the only methodological change being an instruction that participants must respond to stimuli as quickly as possible. Participants were found to have responded with considerably higher error rates, falsely identifying tools as guns in significantly ($p<.003$) higher proportions when primed with a black face than when a white face was shown.

More recently, Miller *et al* (2012: 728) conducted a series of experiments which found white college students to have been quicker in performing 'avoidance behavior' actions after being exposed to images of black faces than after being exposed to images of white or Asian faces. In their first experiment ($N=82$), participants were first primed with video intended to provoke avoidance behaviour. In one condition, this included a scene from *The Silence of the Lambs* in which 'a White female is stalked by a White male murderer', intended to elicit a self-protective, fearful state, while another condition included a scene from *Pink Flamingos*, in which an actor eats dog faeces, intended to 'produce a desire to avoid potential sources of pathogens and elicit emotion (disgust) consistent with that desire' (Miller *et al* 2012: 728). Participants were then tasked with categorizing faces according to their race by moving a joystick towards or away from themselves (with this varying by condition). Participants who had been primed with *The Silence of the Lambs* (the 'self-protection' condition) were found to have been significantly ($p=.013$) quicker in pushing the joystick away from themselves (an 'avoidance behavior') in response to black faces than white faces. No effect of race, however, was found among participants who had been primed with the scene from *Pink Flamingos* (the 'pathogen avoidance' condition). This result was in line with Miller *et al*'s (2012: 728) hypothesis that:

> Given that Black men are stereotypically associated with physical safety threat more than pathogen threat, we predicted that self-protective motivation (relative to pathogen avoidance motivation) would facilitate greater avoidance behaviors when encountering Black men as compared to White men.

In a second experiment ($N=139$), a group of participants were exposed to the same 'self-protection' condition as before (viewing the scene from *The Silence of the Lambs*) while others were shown a 'time-lapsed videography of urban living from the film *Koyaanisqatsi*', intended as a neutral condition (Miller *et al* 2012: 730). Participants were then tasked with pushing a joystick away from themselves as quickly as possible in response to either white, black, or Asian faces displayed in different blocks of trials. Participants in both conditions were found to have responded significantly (p<.001) faster towards black faces than either white or Asian faces. This effect was significantly (p=.034) greater, however, in the 'self-protection' condition than in the neutral condition. These results were in line with a preliminary questionnaire (N=30) carried out as part of the same study which found a much higher percentage of college students to have listed danger associated concepts (such as violence, aggression, and hostility) as stereotypes of black men (93.3%) than white (3.3%) or Asian men (0%), suggesting that the differences in avoidance behaviour resulted from stereotype activation.

A meta-analysis of 167 priming studies conducted by Cameron *et al* (2012) found correlations between sequential priming tasks and both behavioural measures (r=.28) and explicit attitude measures (r=.20). The meta-analysis, which included a wide range of experimental designs, included only sequential priming studies (in which the stimulus onset asynchrony between priming stimuli and target stimuli was zero) which examined the relationship between sequential priming and behaviours or sequential priming and explicit attitudes (Cameron *et al* 2013: 333). To examine publication bias, as social science studies reporting statistically significant (p<.05) results are approximately 41% more likely to be published than studies which report null results (Franco *et al* 2014), the meta-analysis was carried out after plotting the effect size in each study against its sample size then examining the mean effect size estimates, and included 'enough unpublished studies that we could examine publication status as a moderator of convergent validity', finding no significant (p=.94) difference in the effect sizes of published versus unpublished studies (Cameron *et al* 2013: 338).

This area of research is not without controversy, however, with the robustness of social priming findings called into question after attempted replications of high-profile studies such as Bargh *et al* (1996) and Dijksterhuis & van Knippenberg (1998) failed to be yield confirmatory results (cf. Doyen *et al* 2011; Shanks *et al* 2013).

5.2.2 Replication Issues

The need for more rigorous replication in social psychology was recently brought to the fore after a study (Bem 2011) published in the *Journal of Personality and Social Psychology* claimed to show evidence of psychic phenomena (or 'pre-cognition') in 8 of 9 experiments. The most widely replicated of these, Bem's (2011) eighth and ninth experiments (N=100; N=50), each presented participants with a word recall task then later had them rehearse those words, with the published results suggesting that *post-hoc* rehearsal had significant (p=.029; p=.002) effects on participant performance on the prior tasks. Bem (2011: 42) claimed that the results 'show that practicing a set of words after the recall test does, in fact, reach back in time to facilitate the recall of those words'. These findings were, perhaps unsurprisingly, not confirmed by subsequent replication studies, with Ritchie *et al* (2012) finding no effect of after-task priming in 3 direct replications conducted independently at 3 different universities, and Galak *et al* (2012) failing to find significant effects in 7 replication attempts (total N=3,289). Furthermore, Galek *et al* (2012: 933) conducted a meta-analysis of 10 published and unpublished replications of Bem's (2011) eighth and ninth experiments, as well as Bem's (2011) original findings, concluding that 'the average effect size (d=.04) is no different from zero.'

The validity of somewhat less controversial studies, such as Bargh *et al* (1996) and Dijksterhuis & van Knippenberg (1998), have also been called into question due to poor replicability. Doyen *et al* (2012) attempted a replication of 2 of Bargh's (1996) experiments (N=34; N=30), which had found significant (p<.01; p<.05) effects of viewing scrambled sentences containing words related to 'elderly stereotypes' on subsequent participant walking speeds, with those who had viewed the 'elderly stereotype' words (such as *old, grey, wise*, and *retired*) measured to have significantly slower walking speeds immediately following the task than those who had viewed sentences containing 'age-non-specific words' (Bargh *et al* 1996: 237). While a previous replication (N=77) conducted by Cesario *et al* (2006) appeared to confirm the elderly-stereotype priming effect found by Bargh *et al* (1996), Doyen *et al*

(2012: 1) claim that both studies ‘can be questioned based on imprecise timing methods’, as each had relied on secondary researchers (who were unaware which priming condition participants had been exposed to) using hand-held stopwatches to record participant walking times over a set distance. Subsequently, Doyen *et al* (2012) aimed to measure participant speeds more accurately by using hidden infrared sensors to record participant walking times over the same distance. Doyen *et al* (2012: 2) also ensured that the experimenters administering the priming stimuli were unaware of the priming condition given to each participant, and had ‘neither prior expectations toward participants behavior nor knowledge of the original experiment.’ In a first replication (N=120), no significant difference was found between the walking speeds of those who had been primed with ‘elderly words’ versus those who had been primed with ‘neutral words’.

A second replication (N=50) was then conducted, in which half of the experimenters were told during an hour long briefing that the primed participants would walk slower as a result of the prime, and half told that the participants would walk faster. Participants, however, were instead randomly assigned to conditions during the experiment. In addition, the first participant tested by each experimenter ‘was a confederate who had been covertly instructed to act in the manner expected by the experimenter.’ (Doyen *et al* 2012: 3). Furthermore, experimenters were instructed to measure participant walking times via hand-held stopwatches, as in the original study, giving a measure of subjective timing against which the objective timings recorded by the infrared sensors could be compared. When timed by stopwatch, participants were found to have walked significantly ($p<.002$) slower after being primed with ‘elderly stereotype words’ than those primed with ‘neutral words’ when tested by an experimenter who expected the primed participants to walk slower. Participants who had been primed with ‘elderly stereotype’ words, however, were found to have walked significantly ($p=.012$) faster than those primed with ‘neutral’ words when tested by an experimenter who expected them to walk faster, suggesting that experimenter bias was responsible for producing this effect. Furthermore, the infrared sensors revealed participants to have walked significantly ($p=.014$) slower in the 'elderly stereotype' condition that in the 'neutral words' condition when experimenters expected participants to walk slowly, replicating Bargh *et al*'s (1996) effect between these conditions. When the experimenter expected participants to walk quicker, however, no significant effect of priming condition was observed. The study also revealed walking speeds to have been significantly ($p<.001$) slower when experimenters believed participants were being primed to walk slowly than when they believed the prime would make them walk faster. Overall, the results suggest that some element of experimenter behaviour was responsible for the variance in participant walking speeds throughout the task, and bring Bargh *et al*'s (1996: 242) findings into question.

Similarly, Shanks *et al* (2013) conducted a series of experiments attempting to replicate Dijksterhuis & van Knippenberg (1998), which claimed that participant performance in general knowledge tests had been influenced by first imagining 'professor' or 'soccer hooligan' stereotypes. In their first 2 experiments, Shanks *et al* (2013) showed participants 8 minute-long video clips of either professors discussing cosmology or a documentary about soccer hooliganism, then had participants spend 5 minutes listing the attributes of a typical professor or soccer hooligan before taking a test consisting of Raven's Advanced Progressive Matrices.[4] The decision to change the test from a general knowledge test to one which involves matching geometric patterns was justified by Shanks *et al* (2013: 2) as follows:

> If the effects of priming are thought to be due to changes in motivation or strategy, then examining performance in a general knowledge test seems less than ideal given the binary nature of such knowledge (known/unknown). Instead, employing a test of analytical thinking and problem solving should be better suited to detecting priming effects.

The first such experiment ($N=40$) found a statistically insignificant ($p=.14$) difference between participant test scores in the 'professor' condition versus

[4] Raven's Progressive Matrices is an intelligence test which infers a measure of IQ (by correlation with percentile score on the test) solely from participant ability to complete logical sequences expressed through geometric symbols (cf. Raven 1938)

the 'soccer hooligan' condition. Incongruously, those in the 'soccer hooligan' condition were found to have performed better than those in the 'professor' condition. A second experiment (N=16) repeated the methodology of the first, but removed the video clips from the pre-test conditions. Again, those in the 'soccer hooligan' condition were found to have performed better in the test than those in the 'professor' condition, but not to a significant (p=.43) degree. A third experiment (N=44) repeated the methodology of the second experiment, but replaced the Raven's Progressive Matrices test with general knowledge questions and extended the priming procedure from 5 minutes to 9 minutes. No significant (p=.33) difference in participant test scores between the 'professor' and 'soccer hooligan' conditions was observed. In a fourth experiment (N=100), Shanks *et al* (2013) conducted a close replication of Dijksterhuis & van Knippenberg's (1998) original study, with a priming phase of 5 minutes followed by a general knowledge test. Once again, no significant (p=.28) divergence was found between participant scores by condition, suggesting little to no effect of stereotype priming on participant test performance.

Overall, it would seem wise to avoid generalising from the results of any individual priming study until further replications have been carried out, especially when methodologies allow for factors other than primes to influence subsequent participant behaviour. Replication is somewhat more difficult with regards to sociolinguistic perception studies, however, as direct replications must necessarily involve both equivalent auditory stimuli and listeners drawn from the same speech communities as utilised in original studies. This is made increasingly impractical by the ever-changing nature of language, with speech varieties and perceptions of sociolinguistic variables within speech communities prone to change over time, necessitating that a direct replication be carried out not only within the same linguistic environment but in a relatively short timespan after an original study. Failed replications of Niedzielski's (1999) Detroit vowel priming study (Lawrence 2015), or Labov *et al*'s (2011) newsreader experiment (Levon & Fox 2014), for example, were conducted in different countries and examined different sociophonetic variables than the original studies, making direct comparisons problematic. It would seem, then, that a rigorous meta-analysis of sociolinguistic perception studies is needed in order to determine whether the effects found in previous studies are generalisable to other variables in other locations.

5.2.3 The Implicit Association Test

Perhaps the most common method of examining unconscious biases, however, is Greenwald *et al*'s (1998) Implicit Association Test (IAT). The IAT works by measuring participant response times in categorising stimuli according to both positive and negative attributes. Participants are presented with stimuli (generally visual, via computer display), which must be rapidly categorised using computer interfaces (ordinarily different keys on a keyboard) assigned to each hand. Greenwald *et al* (1998) refer to this visual stimuli as the 'target-concept discrimination', consisting of words or images which represent the different concepts under study, and which must be categorised according to opposing values referred to as the 'attribute dimension'. In order to determine the subjects' underlying attitudes towards the target stimuli, participant response times in apportioning the visual stimuli to different attributes are compared, with responses measuring less than 300ms or more than 3,000ms being excluded from analyses. For example, in the IAT shown in figure 5.2 (overleaf), which can be taken on Harvard University's *Project Implicit* website[1], participants are tasked with categorising black faces as being African American and white faces as being European American. Participants are then tasked with categorising positively valenced words (such as *joy, happy*, and *love*) as 'good' and negatively valenced words (such as *failure, hurt*, and *evil*) as 'bad', with categorical labels in opposing corners at the top of the screen. In following trials, the African American and European American labels appear alongside the 'good' and 'bad' category labels, and participants are tasked with categorising both black faces and negatively valenced words to the left side of the screen (using the *e* key, in this example) and European American faces and positively valenced words to the right of

[1] https://implicit.harvard.edu/implicit/takeatest.html [27/06/15]

the screen (using the i key). A subsequent trial then sees the 'good' and 'bad' labels switch position, with participants tasked with categorising the European American faces and negatively valenced words as to one side of the screen, and African American faces and positively valenced words to the other. The order of trials containing both target stimuli labels (e.g. African American and European American labels) and valence labels ('good' and 'bad') are ordinarily reversed across participants or in subsequent trials in order to control for fatigue effects. By comparing participant reaction times in categorising black faces and the differently valenced attributes with white faces and the differently valenced attributes, a measure of the subjects' relative implicit associations towards the two racial groups can be inferred. If, for example, a participant was much quicker in categorising black faces than white faces along with positively valenced attributes, then this would indicate an implicit preference for black faces over white faces and, from this, implicit racial bias could be inferred.

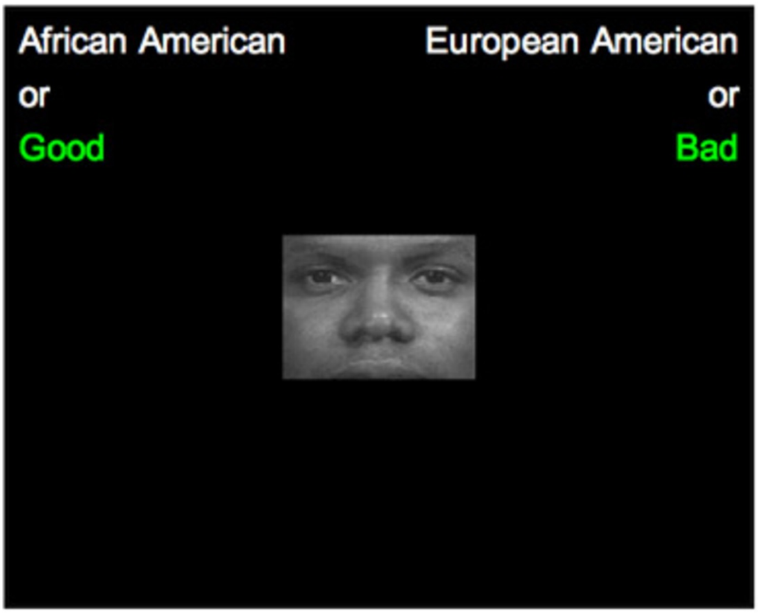


Figure 5.2: Participant view of a typical IAT. Participants are tasked with categorising visual stimuli according to attributes on either side of the screen, with attributes changing positions throughout successive blocks of trials.

Examining race-related stereotypes, Greenwald *et al* (1998: 1473) conducted an IAT with a 'target-concept discrimination' of 'Black names' (such as Darnell, Lamar, and Malik) versus 'White names' (such as Brandon, Ian, and Jed), and an 'attribute dimension' of 'pleasant' versus 'unpleasant'. The IAT (N=26) was taken by White American students (14 female and 12 male), who were then given semantic differential surveys intended to measure race-related attitudes and beliefs. Greenwald *et al* (1998: 1474) report that 'the data indicated an implicit attitudinal preference for White over Black, manifest as faster responding for the White + pleasant combination than for the Black + pleasant combination.' In other words, participants were slower to assign African American names to the pleasant category than European American names, indicating racial bias towards European American names over African American names. In contrast, the explicit attitudes participants expressed in accompanying questionnaires (containing semantic differential scales) indicated little or no racial preferences. Although this would appear to indicate a disparity between the implicit and explicit race-related attitudes of the subjects, Greenwald *et al* (1998: 1474) opine that the disparities in the IATs may have been affected by the participants being 'much less familiar with the African American stimulus names than they were with the White-American stimulus names.' The results of racial bias studies conducted since then (such as Payne 2001), however, point towards the IAT measures being representative of the subjects' implicit attitudes. Using another IAT (N=32), Greenwald *et al* (1998) also examined the differences in evaluative associations of Japanese and Korean ethnic groups among Japanese Americans and Korean Americans (Greenwald *et al* 1998: 1470). The sample was composed of seventeen Korean Americans (eight female and nine male), and fifteen Japanese Americans (ten female and five male). For this IAT, the 'target-concept discrimination' consisted of Korean names versus Japanese names, while the 'attribute dimension' used was 'pleasant' versus 'unpleasant'. After the IAT task, subjects were given semantic differential surveys in order to assess how involved they were in their ethnic sociocultural networks, the level of competence they had with each language, and their explicit attitudes towards Japanese and Koreans (Greenwald *et al* 1998: 1471). The results of the IAT patterned as expected, with Korean subjects finding it more difficult to perform 'Japanese+pleasant' categorisations than 'Korean+pleasant' ones, and the reverse proving true for the Japanese subjects (Greenwald *et al* 1998: 1471-2). IAT differentiations were also found to correlate positively with the level of immersion subjects had in their respective cultures, determined via responses to several survey questions. No correlation, however, was found between the explicit attitudes towards Japanese and Koreans expressed in the semantic differential surveys and the implicit attitudes implied by the IATs, which Greenwald *et al* (1998: 1472) claim 'strongly suggests that the semantic differential and the IAT measured different constructs.'

Also utilizing an IAT (N=172), Rudman & Glick (2001) tasked 105 female and 67 male participants with categorizing 'agentic-meaning' words (such as *independent, competitive, autonomous, individual*, and *self-sufficient*) and 'communal-meaning' words (such as *communal, attached, cooperative, together, kinship,* and *commitment*) into either male or female categories. The study found that participants who conformed most to gender stereotyping during the IAT, being quicker in categorizing agentic-meaning words as male and communal-meaning words as female, 'were also likely to view agentic females as interpersonally deficient' (Rudman & Glick 2001: 756). A separate explicit task, however, which involved choosing candidates for a proposed employment role based on application forms, uncovered no significant effect of gender bias.

Another IAT (N=82) conducted by Inbar *et al* (2009) tasked participants with categorising 'gay images' (such as a photograph of two men kissing) and 'straight images' (such as a photograph of a man and a woman kissing) according to an attribute dimensions consisting of either 'gay' or 'straight' labels in combination with either positively or negatively valenced words (such as *pleasant* and *unpleasant*). Participant reaction times revealed a highly significant ($p<.0001$) effect, with participants faster in categorising straight images as pleasant and gay images as unpleasant. This was despite 73% of participants in a separate task explicitly reporting that there was 'nothing wrong with gay men French kissing in public' — exceeding the 55% of participants who reported that there was 'nothing wrong with straight couples French kissing in public' (Inbar *et al* 2009: 436).

Nosek *et al* (2007) examined 10 different IAT studies which had participants sit the same IATs at different times, finding a strong correlation (r=.54) between participant results in their first and second IATs, suggesting a high degree of test-retest reliability. This was followed by a meta-analysis of 122 IAT studies carried by Greenwald *et al* (2009), containing 184 IATs and totalling 14,900 participants, which found IAT measures to correlate (r=.274) with behavioural, judgement, and physiological measures. The analysis also found IAT and self-report measures to correlate strongly in investigations of consumer preferences (r=.319) and political preferences (r=.537). An opposite effect, however, was found between IATs and self-report measures examining responses towards different racial (r=.198) or 'other intergroup' (r=.207) attributes, which included 'behavior toward groups defined by ethnicity, age, or weight' (Greenwald *et al* 2009: 24). The findings suggest that IATs provide a more sensitive metric of participant associations when dealing with socially sensitive stimuli, as Greenwald *et al* (2009: 32) state:

> In the studies examined in this review, high social sensitivity of topics was most characteristic of studies of racial and other intergroup behavior. In these topic domains, the predictive validity of IAT measures significantly exceeded the predictive validity of self-report measures.

It would seem, then, that the IAT is a reliable means of inferring latent attitudes towards social stimuli, demonstrating perceivers to automatically make unconscious social evaluations on processing visually-derived social information. As such, it has recently been adopted as the primary means of examining the unconscious processing of linguistically-derived social information, an area of research which is still very much in its infancy.

5.3 Implicit Sociolinguistic Cognition

Sociolinguists have speculated that language evaluation may be carried out without conscious awareness since the discipline's inception, with Labov

(1972) noting that his informants 'documented a socially rich system of meaning for two vocalic variables which, he reports, his informants could not name or describe explicitly.' (Campbell-Kibler 2013: 310). Milroy & McClenaghan (1977: 8) also speculated that unconscious processes may explain the tendency of evaluations of RP, Scottish, Southern Irish, and Ulster Scots accents to remain consistent even when misidentified by those judging them:

> It has been widely assumed that an accent acts as a cue identifying a speaker's group membership. Perhaps this identification takes place below the level of conscious awareness. [...] Presumably by hearing similar accents very frequently [one] has learnt to associate them with their reference groups. In other words, accents with which people are familiar may *directly* evoke stereotyped responses without the listener first consciously assigning the speaker to a particular reference group.

While a wealth of research has been carried out on automatic evaluative responses in the domain of social psychology, repeatedly showing people to make automatic and unconscious negative evaluations of out-group members (cf. Fazio *et al* 1986; Wilson & Brekke 1994; Greenwald *et al* 1998; Payne 2001), these have never had a sociolinguistic focus, or even utilised speech as stimuli. In recent years, however, there have been a small number of notable studies examining implicit attitudes in relation to sociolinguistics (cf. Babel 2009; Redinger 2010; Campbell-Kibler 2012, 2013; Pantos & Perkins 2013), with the most widely-used method of investigation being the Implicit Association Test.

Kristiansen (2009) examined both conscious and unconscious attitudes towards various dialects among adolescents throughout Denmark. The study was conducted by means of subjective reaction tests, evaluating samples of young speakers thought to have accentual features characteristic of either the conservative, modern, or regional forms of Danish (Kristiansen 2009: 173). The stimuli for the experiment was collected through informal interviews with groups of young people, which were then edited into 30 second samples before being presented to listeners with an accompanying semantic differential survey. Respondents were asked to grade speakers on various personality traits (such as intelligence and 'niceness') via differential scales, with a supplementary open-ended question: 'what is your impression of this person?'. In order to facilitate subconscious 'below the line' responses from listeners, the exact purpose of the experiment was not revealed to participants until after the surveys had been completed and they had been asked what they thought that the experiment was about. That none of the subjects were able to correctly identify the focus of the research as being related to 'attitudes towards dialects', indicates that the methodology was wholly successful in this respect (Kristiansen 2009: 178). Participants were then told the reason for the experiment before being played the data once more, while being asked to indicate which speakers they perceived to be from Copenhagen, and whether the speech was rigdansk (Standard Danish) or not. The results for the part of the experiment concerned with subconscious evaluation found that speakers with conservative accents received the most favourable ratings in what Kristiansen (2009: 187) terms 'superiority values' (which include intelligence, conscientiousness, or trustworthiness), whereas speakers with accents considered modern received the most favourable ratings on 'dynamism values' (such as being self-assured, fascinating, or nice). Speakers with accents perceived as being 'local' (from regions other than Copenhagen) were found to have received less favourable ratings throughout all traits than speakers with either conservative or modern dialects. The latter part of the experiment found that speakers with more conservative features were considered to be closest to *rigsdansk*, a non-regional prestige variety of Danish, whereas speakers with more modern forms were generally thought to be from Copenhagen. Kristiansen (2009: 187) concludes that young Danish speakers 'operate with two systems for valuation of language differences' one which is put to use when social evaluation is consciously carried out, and another when it is processed below the level of conscious awareness.

Babel (2009) conducted a 'shadowing task' and accompanying IAT (N=150) among white college students in order to investigate the relationship between implicit racial bias and speech behaviour. The 'shadowing task' included auditory stimili consisting of 50 different words containing /i/, /æ/, /ɑ/, /o/, and /u/, which were recorded from a white male and a black male in their early 30s. Participants were charged with repeating auditory tokens, heard over headphones, which was recorded for later analysis to determine the level of phonetic distance they displayed for each variable under examination. Participants were then given an IAT which had them categorise both African American names (such as *Aaliyah* and *Jamal*) and Caucasian American names (such as *Emily* and *Cody*), as well as 'good words' (such as *caress* and *cheer*) and 'bad words' (such as *abuse* and *agony*), according to BLACK and WHITE target dimensions displayed either side of the screen. The experiment found participants who had been quickest in categorising the African American names with positive attributes, indicating lower levels of implicit racial bias, to have shown the greatest levels of accommodation in their productions of /æ/ and /ɑ/ when repeating stimuli tokens recorded from the black speaker. This suggests that measures of implicit bias can, in certain circumstances, serve as a predictor of speech behaviour.

Redinger (2010) also conducted an IAT, modeled on Borton *et al*'s (2007) IAT measuring self-esteem. Redinger's IAT focused on 'the measurement of implicit language attitudes towards Luxembourgish and French among secondary school students in Luxembourg' (Redinger 2010: 123). Comparing participant reaction times when assigning positive and negative stimulus words to both Luxembourgish and French, Redinger (2010: 189) found subjects to have reacted faster when associating Luxembourgish with positive traits than when assigning positive traits to French – by a mean difference of 140ms, suggesting that the participants implicitly viewed their 'own' language (Luxembourgish) in a more positive light than they did French. Due to the small sample size utilized in Redinger's (2010: 189) IAT, however, this result could not be tested for statistical significance.

Reporting on an experiment conducted in 2010, Pantos & Perkins (2013) appear to have been the first to use auditory stimuli in an IAT (N=165), finding listeners to have reacted significantly ($p<.001$) faster when categorizing positive personality traits with recordings of an American English speaker than when asked to categorize the same traits with a native Korean speaker of English — indicating an implicit positive bias towards the American English speaker. In contrast, the same participants' explicit responses towards audio recordings of a mock medical malpractice trial, featuring the American and Korean English speakers in various roles, revealed a significant explicit bias (p=.01) towards the Korean English speaker (Pantos & Perkins 2013). The divergence between the participants' explicit responses and the implicit biases implied by their IAT results is consistent with the pattern generally found in social psychology experiments (cf. Greenwald *et al* 1998; Rudman & Glick 2001; Inbar *et al* 2009), indicating that listeners implicitly make automatic social evaluations upon hearing speech in much the same manner that they do with visually-derived social information.

Most recently, Campbell-Kibler (2012, 2013) conducted a number of IATs investigating the implicit associations which listeners made towards different sociolinguistic variables in the United States. In the first such experiment (N=24) participants were tasked with categorising tokens of ING variation (represented orthographically in words such as *being* and *bein'*) with pairs of social categories across three separate tasks. In the first task, social categories consisted of the names of Northern and Southern US states (such as *Massachusetts* versus *Mississippi*), white-collar versus blue-collar professions (such as *lawyer* versus *plumber*), and country music singers versus news anchors (such as *Billy Ray Cyrus* versus *Walter Cronkite*). Respectively, these were intended to test participant associations between ING variation and regional stereotypes, education and occupational class, and differing language ideologies. All three tasks revealed participants to have associated ING variation with the social categories in the directions expected, with participants significantly quicker in categorising orthographic representations of /ɪŋ/ with Northern US states (p<.001), white-collar professions (p<.001), and news anchors (p=.002) and, by the same measure, orthographic representations of /ɪn/ with Southern US states, blue-collar professions, and country music singers. Furthermore, participant responses towards the different social categories were found to have been highly correlated (p<.028). The results suggest that participants, who were primarily college students from Ohio, implicitly associate orthographic representations of /ɪn/ with less socially prestigious dialect areas, lower levels of education and occupational class, and less overtly prestigious language ideologies than they do representations of /ɪŋ/. Problematically, however, participants may have been responding to perceived spelling errors in the orthographically represented /ɪn/ words, rather than the underlying phonetic forms which they were intended to represent.

In a second experiment (N=15), Campbell-Kibler (2012) addressed this by adapting the IAT to present auditory stimuli tokens recorded by the study author in place of the orthographic representations utilised previously. In the first task, auditory stimuli consisted of ING tokens, produced with both /ɪŋ/ and /ɪn/ realisations, with social categories consisting solely of Northern versus Southern US states (with the assumption that comparable results between experiments would translate to the other social categories previously tested). A second task introduced auditory tokens with and without /ay/ monophthongisation (in words such as *my, eye*, and *pie*), a linguistic feature associated with Southern US dialects. A third task replaced /ay/ monophthongised tokens with auditory tokens featuring /t/ release variation (in words such as *cat, bat,* and *mat*), a linguistic feature associated with level of education and articulateness. As in the previous experiment, participants were found to have been significantly quicker (p=.002) in categorising /ɪŋ/ with Northern US states and /ɪn/ with Southern US states. The second task revealed participants responses towards /ɪn/ realisations to have correlated significantly (p=.004) with participant responses towards /ay/ monophthongised realisations, suggesting that listeners hold similar associations towards the Southern accent variants versus the ‘standard’ Northern realisations (/ɪŋ/ and /aɪ/). A similar effect, however, was not found with regards to participant responses towards /t/ released variation in the third task.

A third experiment (N=31) examined correlations between participants implicit associations towards the same linguistic variables, determined via IAT, and their explicit attitudes, gathered via direct questions and a guise-based social evaluation task. Participants were first played pairs of short recordings featuring different realisations of the ING, /ay/ monophthongisation, and /t/ release variables — with each variable produced by a different speaker — and asked to determine which speakers (with different realisations presented in a matched-guise format) sounded most Southern, which sounded most educated, and how big the differences were on a five-point scale. Participants were then directly asked which realisations of words (e.g. /duɪŋ/ versus /duɪn/) sounded most Southern and most educated on a five-point scale. Participants were then given an IAT containing the auditory stimuli in the second experiment. In the first task, participants were found to have rated recordings of the speaker producing /ɪŋ/ realisations as significantly ($p<.001$) less Southern and more educated than recordings of the same speaker producing /ɪn/ realisations. Recordings of another speaker producing non-/ay/ monophthongised realisations were found to have been rated as significantly ($p<.001$) less Southern (but not more educated) than recordings of the same speaker producing /ay/ monophthongised realisations. Similarly, recordings of the speaker producing prominent /t/ release bursts were rated as significantly ($p=.011$) more Southern (but more educated) than recordings of the same speaker with /t/ release bursts removed. When asked directly, however, participants were found to have rated all the Northern standard realisation of each variable as significantly ($p<.001$) less Southern and more educated than their non-standard Southern counterpart realisations. Finally, in the IAT, participants were found to have been significantly ($p<.017$) quicker in categorising Northern standard realisations of ING and non-/ay/ monophthongised realisations with Northern and white-collar adjectives than and Southern non-standard ING and /ay/ monophthongised realisations with Southern and blue-collar adjectives. Participants were found to have categorised tokens containing /t/ released bursts significantly ($<.001$) quicker with white-collar than blue-collar adjectives, but no effect of Northern versus Southern states was found. Furthermore, no correlations between measures (IAT, direct questions, and the social evaluation task) were found. Overall, the IAT results (Campbell-Kibler 2012) show that people are faster to associate more socially stigmatized phonetic variants (/ɪn/ and monophthongised /ay/) with Southern US states and blue-collar occupations than Northern US states and white-collar occupations, and that listeners explicitly consider speakers with more-standardised (/ɪŋ/ and released /t/) phonetic variants to sound more Northern and more educated than speakers heard to produce non-standard realisations.

In another series of IATs (N=28), Campbell-Kibler (2013) discovered participants to have made similar implicit associations towards another Southern accent feature, derhoticity or 'r-lessness'. As in the previous study, monophthongal /ay/ was also included as a variable. Auditory stimuli consisted of single-word tokens containing differing realisations of the variables under examination recorded from 16 speakers. Speakers were grouped into pairs uttering the same five target words, with one speaker in each pair producing a Southern realisation and the other producing a Northern realisation (lower TRAP, retracted LOT, rhoticity, and diphthongal /ay/). As in the previous experiment, Southern features (derhotic and /ay/ monophthongised tokens) were found to have affected participant response times in categorising stimuli, with a significant (p=<.001) effect of /ay/ monophthongised tokens and a significant (r=.40) correlation between associations made towards /ay/ monophthongised tokens and derhotic tokens. A similar effect, however, was not found in participant responses to tokens containing differing TRAP/LOT tokens.

Taken as a whole, the studies strongly suggest that socially-marked phonetic variation can trigger differing implicit associations in listeners, particularly when such variants belong to a heavily stereotyped speech variety (such as Southern dialects of American English) in comparison to a more overtly prestigious 'standard' speech variety (such as Northern dialects of American English). Presumably, this would hold true for other negatively stereotyped speech varieties, such as working-class Glaswegian, versus more overtly prestigious varieties, such as that spoken by middle-class speakers in Glasgow.

5.4 Implicit vs. Explicit Cognition

5.4.1 Evolutionary Basis

Implicit cognition has been under discussion at least as early as Descartes in 1649, who claimed that a traumatic childhood event may 'remain imprinted on [the child's] brain to the end of his life' without 'any memory remaining of it afterwards' (cited in Schacter 1987: 502). Gottfried Wilhelm Leibniz expanded on this in 1704, theorizing that there are 'ideas of which we are not consciously aware, but which do influence behavior.' (cited in Schacter 1987: 502). While there is much debate on the separateness of unconscious and conscious processes, Schaller (2008: 18) posits that automatic evaluative responses developed as an evolutionary 'first impressions' survival mechanism, noting that 'psychological mechanisms may have evolved to implicitly err on the side of making false-positive errors when inferring the potentially-dangerous traits or intentions of others'. This is in line with Miller *et al* (2012) (see p. 77 for an overview), who posit a theory of implicit racial bias as a function of stereotype-activated heuristic threat avoidance, stating:

> Avoidance of physical harm reflects a fundamental evolved motive that influences the way people perceive and respond to their social world. The current research demonstrated that self-protective motivation caused participants to quickly and automatically avoid targets of a heuristically threatening outgroup.

Certainly, it seems plausible that there was a time where making automatic negative evaluations of visually-distinct outgroup members would have been an advantageous survival trait, and thus one which would be naturally selected for throughout successive generations. The evolutionary reasoning behind implicit social cognition would also go some way to explaining why implicit gender biases appear to be more nuanced than implicit biases towards other outgroups (Davison & Burke 2000; Rudman & Glick 2001), as the formation of automatic negative associations towards members of the opposite gender would not be an evolutionary advantageous trait. Following this line of thinking, it seems probable that the same would hold true for associations made upon auditorily identifying outgroup members, such as upon hearing different regional and, presumably, social accents. While speakers of non-standard speech varieties are generally found to make positive explicit evaluations of more prestigious, standardised speech varieties (cf. Coupland 2007), it is not yet known whether such positive evaluations happen on an unconscious level, and further investigation is required in this regard.

5.4.2 Dual Systems vs. Iterative Processing Models

While there is wealth of evidence for cognitive processing below the level of conscious awareness (p.66), there remains debate as to exactly how this differs cognitively from conscious processing. Dual process models have been largely adopted in social cognition research to account for the divergence between conscious and unconscious responses to stimuli (Chaiken & Trope 1999; Epstein 1994; Smith & DeCoster 2000; Kruglanski & Orehek 2007). Such models draw a distinction between Type 1 and Type 2 cognitive processes (Evans & Stanovich 2013). The attributes ascribed to these processes (shown in table 5.1) are drawn from multiple dual systems models, with no single model currently able to account for all of these features.

It is also worth noting that the two types of processes may not be mutually exclusive, as it is 'perfectly possible' that explicit cognition includes a combination of Type 1 and Type 2 processes (Evans 2008: 271). Furthermore, Evans (2008: 271) argues that tasks which are carried out explicitly can become implicit with sufficient repetition, stating that 'We have habitual and automated behavior patterns that once required conscious type 2 effort but seem to have become type 1 with practice and experience.' Evans & Stanovich (2013: 236) also argue that explicit, Type 2 processing is unique to human beings:

Clusters of Attributes Frequently Associated With Dual-Process and Dual-System Theories of Higher Cognition

Type 1 process (intuitive)	Type 2 process (reflective)
Defining features	
Does not require working memory	*Requires working memory*
Autonomous	*Cognitive decoupling; mental simulation*
Typical correlates	
Fast	Slow
High capacity	Capacity limited
Parallel	Serial
Nonconscious	Conscious
Biased responses	Normative responses
Contextualized	Abstract
Automatic	Controlled
Associative	Rule-based
Experience-based decision making	Consequential decision making
Independent of cognitive ability	Correlated with cognitive ability
System 1 (old mind)	**System 2 (new mind)**
Evolved early	Evolved late
Similar to animal cognition	Distinctively human
Implicit knowledge	Explicit knowledge
Basic emotions	Complex emotions

Note. Italicized attributes are the proposed defining characteristics in the current article. Authors proposing two systems include the features attributed to Type 1 and 2 processing but may also include the additional features named.

Table 5.1: Attributes frequently associated with Type 1 and Type 2 processes in dual process models (from Evans & Stanovich 2013: 225).

> Although rudimentary forms of higher order control can be observed in mammals and other animals, the controlled processing in which they can engage is very limited by comparison with humans, who have unique facilities for language and meta-representation as well as greatly enhanced frontal lobes.

While Evans (2008: 259) also states that Type 2 processes are ‘thought to be associated with language, reflective consciousness, and higher-order control with the capacity to think hypothetically about future and counterfactual possibilities’, it would seem that the reference to language solely as an explicit Type 2 process is a false one, as people have been repeatedly shown to respond to speech and accommodate towards the speech of others below the level of conscious awareness (cf. Babel 2009; Campbell-Kibler 2012; 2013).

Although speech is considered to be a uniquely human trait, speech perception is not, as evidenced by the ability of dogs to process speech in much the same manner as humans do, comprehending words rather than merely affective components from suprasegmental information. Heimbauer *et al* (2011) note that 'It is a commonplace [sic] that most dogs recognize their name and a few special words, like 'walk or 'dinner. In extraordinary cases, dogs learn to recognize hundreds of words. Ratcliffe & Reby (2014) played human speech through speakers positioned either side of dogs, and inferred hemispheric processing depending on which speaker the dogs turned towards. When hearing commands which had been manipulated to remove intonational cues, dogs turned to the right, indicating a left-hemispheric bias. When the command was in a foreign language (from the dogs owner) or when the phonemes were arranged to create nonsense phrases, dogs turned to the left, indicating a right-hemispheric bias. This mirrors human speech perception, where the left hemisphere is mainly used to process verbal content and the right hemisphere to process speaker characteristics and emotional content. Furthermore, it has been found that chimpanzees can recognise synthetic speech, even with reduced acoustic cues to phonetic context. Heimbauer *et al* (2011) found a chimpanzee with knowledge of 128 spoken words to respond above chance level in selecting visual symbols (in a four-alternative choice task) when played corresponding words synthesized as three-tone sinewaves. The notion of speech perception as a Type 1 (although not necessarily exclusively so) process is central to any theory of implicit sociolinguistic cognition, and one that appears to be supported by the relatively few studies carried out in the field so far (p.87).

While Evans & Stanovich (2013) attribute the lack of a single agreed dual process model to the existence of multiple kinds of implicit processing erroneously grouped together as a single system, others dispute the idea that there are two distinct cognitive systems, instead arguing for iterative models of cognitive processing (Cunningham & Zelazo 2007; Van Bavel *et al* 2012).

Iterative models, such as that proposed by Cunningham & Zelazo (2007) put forward the idea that evaluations are dynamic, and subject to subsequent iterative re-evaluations, rather than implicit and explicit. Under such models, the rapid processing evident in previous research on unconscious processing is explained as resulting from fewer 'evaluation cycles', as Cunningham & Zelano (2007: 97) outline:

> Whereas evaluations that are based on few iterations of the evaluative cycle are relatively automatic, in that they are obligatory and might occur without conscious monitoring, evaluations based on additional iterations and computations are relatively reflective.

Cunningham & Zelano (2007: 98) hypothesise that such 'lower-order' evaluative processes provide affective information on valence (whether an attitude object is 'good' or 'bad'), with 'higher-order' processes recruited during subsequent iterations. While this would seem in line with dual process theories of cognition, iterative processing models argue that information is repeatedly 'passed back' to lower-order processes for re-evaluation in a recursive feedback loop, with subsequent iterations serving to provide more carefully considered evaluations (Cunningham & Zelano 2007: 98).

While such models are certainly worthy of consideration with regards to implicit sociolinguistic cognition, an in-depth investigation would require a review of the background literature in neuroscience, which is outwith the scope of this thesis. Increasingly, it appears it may not be possible to distinguish dual processing from iterative processing via behavioural studies, as effects ascribed to implicit and explicit evaluations may instead result from varying evaluative iterations, with 'implicit' responses analogous to fewer evaluative iterations and 'explicit' responses analogous to a greater number of evaluative iterations.

5.5 The Visual World Paradigm

Rather than using an Implicit Association Test, as in other investigations of implicit sociolinguistic cognition, this study has focussed on adapting the

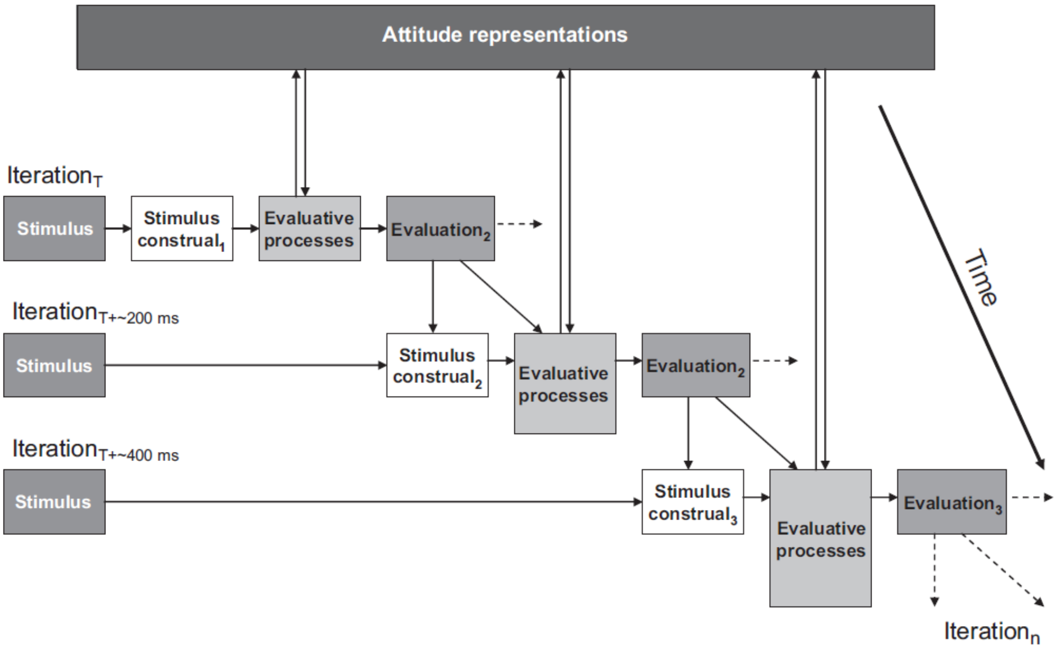


Figure 5.3: Visual representation of an iterative processing model (from Van Bavel *et al* 2012: 444). Under this model, a perceiver's initial attitudes towards a stimulus are re-evaluated over the course of continuing 'evaluation cycles'.

Visual World methodology — an established psycholinguistic eye tracking technique — for sociolinguistic enquiry. The Visual World Paradigm was devised after an experiment by Cooper (1974), who discovered that individuals spontaneously fixate upon the visual referents of words being heard. Cooper (1974) also discovered participants to have fixated on semantically related visual referents of words (such as an image of a camera while hearing the phrase, *while on a photographic safari*), with 'over 90% of the fixations to the critical objects being triggered either while the corresponding word was spoken or within 200ms of word offset.' (Huettig *et al* 2011: 151). Cooper (1974: 84) reported that he had discovered 'a practical new research tool for the real-time investigation of perceptual and cognitive processes and, in particular, for the detailed study of speech perception, memory, and language processing.'

The discovery, however, was largely forgotten until Tanenhaus *et al* (1995) adopted the technique to investigate the manner in which listeners make use of visual information to interpret sentences. In their study, Tanenhaus *et al* (1995) instructed participants to move in-room objects while their eye movements were recorded by a head-mounted eye tracker. Instructions took the form of sentences, such as *Put the apple that's on the towel in the box.* As in Cooper (1974), participants were found to have fixated on objects immediately after hearing them named. When hearing instructions such as *Touch the starred yellow square*, participants were found to have fixated upon in-room objects possessing the described properties in turn (e.g. first fixating upon a star-shaped object, followed by a yellow object, and finally a square object) whenever such objects were present. Fixations were recorded to have occurred at an average of 250ms after the end of words when only one related object was present (e.g. at the end of 'yellow' when the room contained only one yellow object). When presented with a grid containing playing cards and given more complex instructions (such as *Put the five of hearts that is below the eight of clubs above the three of diamonds*), participants were found to have made use of referential cues, such as fixating on cards above the five of hearts immediately after hearing 'below' (Tanenhaus *et al* 1995: 1632). When instructed to move objects with initially similar names (such as 'the candy' and 'the candle') while one of those objects were present, participants were found to have fixated upon the object at an average of 145ms from the end of the target word (compared with 230ms when both named items were present). As it takes around 200ms for a saccadic eye movement to occur, Tanenhaus *et al* (1995) found that participants had fixated on objects before hearing the end of the word when no competitor objects were present.

Next, Tanenhaus *et al* (1995) tested syntactic ambiguities, presenting listeners with the instructions *Put the apple on the towel in the box* (ambiguous) and *Put the apple that's on the towel in the box* (unambiguous). In one condition, participants were presented with a towel with an apple on top, another towel (without an apple), a box, and a pencil. In a second condition, the pencil was replaced with a second apple on a napkin. Different fixation behaviours were observed between the two conditions, with participants given the ambiguous instruction in the first condition fixating on the sole apple 500ms after hearing 'apple', then fixating on the towel without the apple (the incorrect referent) in 55% of cases, indicating a tendency to interpret 'on the towel' as specifying the destination (Tanenhaus *et al* 1995: 1633). Participants given the unambiguous instruction in this condition were found to have looked at the correct referent (the towel with the apple on it) in 100% of cases. In the second condition, where two apples were present, participants were found to have reacted to the ambiguous instruction by fixating upon the incorrect referent (the napkin) in 61% of cases (compared to 42% while hearing the unambiguous instruction), indicating that the modifier 'on the towel' was interpreted as a modifier, rather than a destination, in this condition.

As a whole, Tanenhaus *et al* (1995: 1634) showed that 'people seek to establish reference with respect to their behavioral goals during the earliest moments of linguistic processing' , while demonstrating the validity of eye tracking methodologies for observing the mental processes that occur during spoken language comprehension. Experiments using this type of methodology have subsequently come to be referred to as 'Visual World' experiments.

Speech has also been shown to trigger listener fixations towards on-screen images. Altmann & Kamide (1999: 250) conducted a similar experiment (N=24), presenting participants with stimuli consisting of 'semi-realistic scenes', each paired with two different semantically-related sentences. Figure 5.4 (overleaf), for example, shows one such scene — depicting a ball, a boy, a cake, a toy car, and a toy train set. This image set was paired with the auditory sentences *The boy will move the cake* and *The boy will eat the cake*. For this stimuli, participants were found to have fixated upon the cake significantly ($p<.007$) earlier in the 'eat' condition than in the 'move' condition, suggesting that hearing verbs facilitates fixations towards semantically related visual referents.

In order to investigate if the effect applied to words other than verbs, Kamide *et al* (2003) conducted an experiment (N=64) in which similar scenes were presented to participants, with auditory stimuli containing semantically

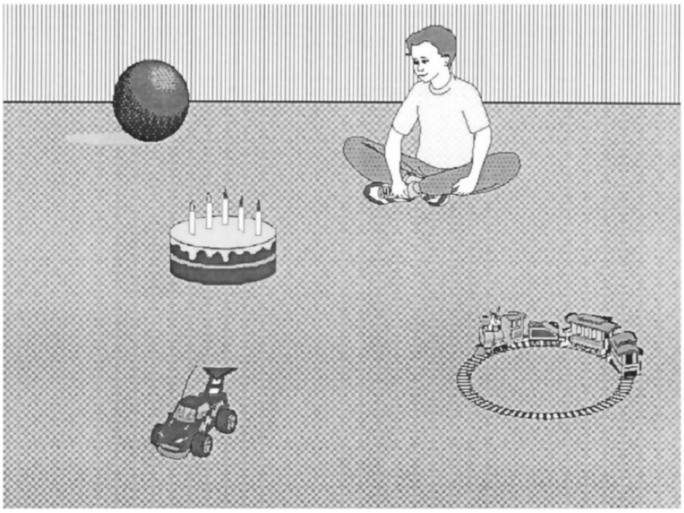


Figure 5.4: Visual scene used by Altmann & Kamide (1999: 250)

relevant sentences varying in initial and final nouns, such as *The man will ride the motorbike* versus *The girl will ride the carousel*. For this stimuli, participants were found to have produced significantly (p=.04) more looks to an image of a motorbike upon hearing 'the man' than hearing 'the girl'. This is particularly notable, as it not only shows an effect of nouns on listener fixations, but suggests that automatically activated attitudes (as described on p.73 by Fazio *et al* 1986) trigger fixations towards semantically related visual referents.

The visual referents focussed on by listeners have also been found to be affected by prosodic information. Dahan *et al* (2002), for example, presented participants (N=16) with image sets containing two images which contained phonetically-similar onsets (such as an image of a 'candy' and an image of a 'candle') alongside two distractor images. Each image set was then paired with auditory stimuli consisting of a series of recorded sentences instructing processes relating to the on-screen visual stimuli. For example, in the image set depicting a candy and a candle, the utterance was follows, with pitch-accented phrases shown in bold text (Dahan *et al* 2002: 297):

Put the candle above the triangle; now put the candle **above the**

square.

Put the book below the triangle; **now put the candle above the square**

Put the candy below the triangle; now put the book above the square.

Participants were found to have fixated significantly (p<.01) more often on competitor images (i.e. an image of a candle when the word 'candy' was heard) when the critical phrases were pitch-accented, rather than de-accented. This indicates that pitch-accented phrases triggered participants to expect a change in visual referent from those previously heard in the auditory stimuli (e.g having heard the word 'candy' and looked towards the candy, a change in speaker pitch prompted fixations towards the candle). This demonstrates that suprasegmental cues play a role in the processing of semantic information.

Another Visual World study conducted by Salverda *et al* (2003) found fixations to have been influenced by fine phonetic variation. Here, participants (N=30) were presented with image sets containing two paired target images and two distractor images, with target images bearing direct semantic relations to accompanying auditory tokens. For example, one set depicted an image of a ham and an image of a hamster as target images, with auditory tokens of /ˈham/ and /hamˈstə/ (with 'ham' being stressed, and the initial syllable in 'hamster' unstressed). Distractor images represented phonologically dissimilar terms. The initial syllables of auditory tokens were also cross-spliced to create new stimuli tokens, with a token of 'ham' containing the first syllable of /hamˈstə/, and a token of 'hamster' containing the first syllable of /ˈham/. Here, the lexical items remained identical, with the only audible differences between tokens being the stess of the initial syllables. Participants were found to have fixated on the image of the ham significantly (p<.05) more often than the hamster when hearing the token of 'hamster' which had been spliced with the first syllable of /ˈham/. This demonstrates an effect of lexical stess on the fixations made by listeners and, more generally, indicates that fine phonetic variation has a marked effect on listener processing of speech.

Taken as a whole, these studies demonstrate the efficacy of Visual World experiments for examinations of listener associations made while hearing speech, and show that fine phonetic information can influence listener fixation behaviour.

Also key to the methodology behind the current research are studies conducted by Huettig & Altmann (2005) and Duñabeitia *et al* (2009). Huettig & Altmann (2005) investigated a secondary observation made by Cooper (1974), who found that 53% of listeners fixated on a picture of a sailboat while hearing the word 'lake'. Their Visual World study presented participants (N=60) with visual stimuli consisting of thirty sets of four images (with images displayed in each quadrant of a computer monitor) while auditory stimuli, consisting of sentences containing embedded target words, were presented simultaneously. Three conditions were presented, with one image in each set of visual stimuli being a direct referent of the target word in the first condition, one image in each set bearing a partial semantic relationship to the target word in the second condition, and one image bearing a direct and one image bearing a partial semantic relationship to target words in the third condition. The other images in each set consisted of semantically unrelated distractors. For example, in one set in the third condition, listeners heard the word 'piano' while a picture of a piano was depicted alongside a picture of a trumpet and two semantically unrelated distractor images. Auditory stimuli were 'recorded at a normal speaking rate by a male native speaker of British English [from the Greater Manchester area]' (Huettig & Altmann 2005: 25). Participants were told to 'look at whatever they wanted' during the task, without being given any further explicit instructions (Huettig & Altmann 2005: 26). The study found listeners to have produced significantly ($p=.005$) more fixations upon each of the visual targets throughout the first two conditions than towards distractor images. When both the direct referent (piano) and weakly related image (trumpet) were displayed simultaneously during the third condition, listeners produced signifcantly (p<.0001) more fixations towards the direct referent but, most notably, significantly (p<.002) fewer looks away from the other target image than from the distractor items. This demonstrates that listener fixations towards images are triggered by words which bear only partial semantic relationships to those images.

Also relevant to this study is research carried out by Duñabeitia *et al* (2009) who investigates the different ways in which abstract concepts and concrete objects are represented conceptually. In their Visual World study, participants (N=30) were presented with auditory stimuli consisting of carrier sentences containing target words which either referred to concrete objects or abstract concepts.[5] These were accompanied by visual stimuli comprising an image in each quadrant of a display depicting various items, one of which was semantically related to the target word heard. For example, one set in the abstract condition contained the target word 'faith' with images including a depiction of a cross[6], whereas one set in the concrete condition featured a target word of 'crib' with visual stimuli containing an image of a baby. For each image set, participants were tasked with pointing to the picture corresponding to the target word heard. Although the study found that listeners were quick to focus on the semantically related images regardless of whether the target words represented concrete or abstract concepts, participant fixations were significantly (p<.05) more often and faster when target words related to abstract concepts than concrete referents. In their discussion of these findings, Duñabeitia *et al* (2009: 290) opine that:

> The most straightforward interpretation of these results is that abstract and concrete words differ in the way that they are represented in semantic memory: associated concepts are more readily

[5]Concrete objects being items with a physical referent, and abstract concepts being ideas without physical referents. For the purposes of the current thesis, brand logos were considered to be abstract concepts as, although there are physical objects with logos printed on them, the brand images used as experimental stimuli have no physical referents (in contrast with images depicting physical objects).

[6]While a cross, in this case, was a concrete referent associated with the word 'faith', there is no direct referent for 'faith'.

available for abstract than for concrete words.

This is of particular interest here as the visual stimuli for the experiments carried out in experiments 2 and 3 contained depictions of 'concrete' objects, as well as sets containing brand logos – which can be said to represent abstract concepts (corporate identity rather a concrete referent). Although Duñabeitia *et al* (2009) found this effect by comparing differences in concrete and abstract terms in their auditory stimuli, rather than visual stimuli, their findings appear to suggest that listeners may process abstract associations differently from concrete associations. This notion is revisited in later experimental chapters.

While Visual World studies have, to date, been used primarily to investigate semantic and pragmatic linguistic processing, so far the methodology appears to have been used a handful of time to investigate sociolinguistic phenomena (cf. Koops *et al* 2008; Dahan *et al* 2008), and does not appear to have been previously used to examine social class associations. Fortunately, the city of Glasgow provides an ideal linguistic background for investigations of this type.

5.6 Summary

With regards to implicit cognition, people can respond to visual stimuli without being able to explicitly report that they have seen it (Fowler *et al* 1981; Balota 1983; Marcel 1983). Commonly, studies investigating this phenomenon have done so by comparing direct and indirect responses to stimuli (Cheesman & Merikle 1984; Reingold & Merikle 1988). This paradigm has been adopted in social psychology, where stimuli presented below the level of conscious awareness have repeatedly been shown to affect subsequent behaviour (Cameron *et al* 2012).

People have also been shown to make unconscious social evaluations upon encountering attitude objects (Fazio *et al* 2001). There appears to be an evolutionary basis behind this, with automatic negative associations serving to facilitate faster threat avoidance behaviours (Schaller 2008; Miller *et al* 2012). Debate exists as to whether such automatic processes function under a separate cognitive system from conscious thought (Chaiken & Trope 1999; Epstein 1994; Smith & DeCoster 2000; Kruglanski & Orehek 2007; Evans & Stanovich 2013) or result from lesser or fewer iterations of repeated processes in a single cognitive system (Cunningham & Zelazo 2007; Van Bavel *et al* 2012).

The most common methods for investigating automatic evaluations are the affective priming procedure and the Implicit Association Test (cf. Fazio *et al* 1986; Greenwald *et al* 1998). Both methods demonstrate people to show implicit biases against members of socially-stigmatised out-groups, such as people of different races (Fazio *et al* 1995; Greenwald *et al* 1998; Payne 2001; Miller *et al* 2012;), nationalities (Greenwald *et al* 1998), and sexualities (Inbar *et al* 2009), even in the absence of reports of explicit bias (Greenwald *et al* 1998; Karpinski & Hilton 2001). Similar automatic social evaluations have been observed in listener responses to different regional accents (Pantos & Perkins 2013), with such evaluations linked to realisations of different socially-marked phonetic variants (Campbell-Kibler 2012,2013).

Listeners automatically fixate on the visual referents of words being heard (Cooper 1974), even when those words bear only partial semantic relationships to visual referents (Huettig & Altmann 2005). Listeners have also been shown to fixate on referents which have stereotypical associations with words heard in speech (Kamide *et al* 2003). Fixation behaviour is also affected by pitch accent and lexical stress (Dahan *et al* 2002; Salverda *et al* 2003).

With this in mind, the Visual World Paradigm seems well-suited to examining the automatic associations which listeners make towards different social accents and socially-marked phonetic variants. Glasgow provides an ideal linguistic background for this, being home to documented social working-class and middle-class speech varieties with varying levels of perceived social prestige (Macaulay 1975, 1977; Macafee 1983; Menzies 1991; Torrance 2003), and which native listeners can readily distinguish from socially-marked phonetic variation (MacFarlane & Stuart-Smith 2012).

Chapter 6

Experiment 2 - Listener Fixations Upon Hearing Different Social Accents

6.1 Introduction

In order to investigate whether speaker accent has an impact on the implicit associations formed by listeners, it is necessary to obtain 'on-line', or real-time, data. To achieve this, an experiment was conducted utilizing an SR Research *Eyelink II* eye tracking headset, which measured participant eye movements in relation to on-screen images while auditory stimuli consisting of instructions read by speakers with differing accents were played. In contrast with the previously conducted experiments which provided only off-line data as to the explicit associations participants made, it was hypothesized that the this experiment would reveal divergent effects of speaker voice, reflecting less conscious associations indicated by eye movements. Conversely, the null hypothesis was that no such effects would be found.

Figure 6.1: An image set depicting objects hypothesized to carry 'working-class' (the gun) and 'middle-class' connotation, determined by ratings in a norming task (Experiment 2)

6.2 Method

6.2.1 Participants

The experiment was conducted among 42 native Glaswegian speakers, consisting of 25 females and 17 males (59.5% and 40.5%, respectively), with ages ranging from 18 to 60 years old (M=25.3, SD=8.25). Listeners were recruited on the basis of having been born and lived their whole lives in Glasgow, and if having no significant sight or hearing impairments. Of the 42 participants, 19 (59.5%) were perceived (subjectively) by the researcher as possessing a middle-class accent, and 23 (54.8%) as having a working-class accent. Recruitment was conducted via the Psychology department's online subject pool, from which respondents were directed to an online *Doodle* poll to book an available date and time. Each participant took roughly 25 minutes to complete the task, including an introductory briefing. Participants were each paid £3 for their time at the experiment's conclusion.

The first group of subjects was comprised of 16 females and 5 males (76.2% and 23.8%, respectively), with 9 (42.9%) perceived as possessing middle-class accents, and 12 (57.1%) perceived as possessing working-class accents. Participant ages in this group ranged from 19 to 60 years old, with a mean age of 27.2 years. Due to the opportunistic nature of the sampling, it was not discovered that the gender makeup of this group was unbalanced until the data were collated, which is a factor to consider for future research. Other than this, however, no significant differences between the groups were evident. The second group of subjects consisted of 9 females and 12 males (42.9% and 57.1%, respectively), with 10 (47.6%) perceived as possessing middle-class accents and 11 (52.4%) perceived as possessing working-class accents. Participant ages in this group ranged from 18 to 41 years old, with a mean age of 23.4 years. Age variances between the groups were examined, but were found to be non-significant ($p>.05$).

6.2.2 Materials

It was decided to re-use the visual and auditory stimuli from the previous experiment (Ch.5) in order to make findings comparable. The auditory stimuli consisted of four speakers a working-class Glaswegian male, a middle-class Glaswegian male, a working-class Glaswegian female, and a Glaswegian Asian female. As in Experiment 1, the male speakers were paired with visual stimuli containing the target images for analysis, and the female speakers were paired with distractor image sets, using the same 96 image sets (consisting of 24 image sets containing objects, and 24 image sets containing brand logos, and 48 image sets comprised of distractor images – with 24 of these containing objects, and 24 consisting of brand logos). In order to control for fatigue effects, 6 different randomized stimuli orders were distributed evenly among the subjects. The first three image sets in each experiment consisted of distractor images, in order to familiarize participants with the format of the experiment prior to collecting data.

Participants were tested for eye-dominance before being fitted with an SR

Research *Eyelink II* eye tracking headset. Visual stimuli were displayed to participants via a 21 Dell CRT monitor running SR Research's *Experiment Builder* software, and auditory stimuli relayed via a Dell *5650* 5.1 surround sound system with each speaker directed towards the participant. Audio was played at 25% of the system's maximum volume in each case, in order to ensure that stimuli was presented at consistent amplitudes throughout. A secondary linked PC running SR Research's *Eyelink* software was operated by the researcher throughout the experiment in order to set and monitor eye calibrations in relation to the visual stimuli. It was originally intended to record participants' explicit associations via a portable audio recorder, with subjects being fitted with lapel microphones. This would have had the added benefit of providing auditory recordings of the participants' own social accents. When the recorder's SD card was full and the data were uploaded to a PC, however, it was discovered that the equipment had failed (with recordings containing only white noise). Fortunately, participants' verbal confirmations of on-screen associations were also recorded by the researcher on pencil and paper forms, with perceptual impressions of their social accents noted for later analysis.

6.2.3 Procedure

Participants were taken to a dedicated eye tracking suite within the University of Glasgow's Psychology department on an individual basis, where they were briefed and given consent forms. Participants were then tested for eye dominance using a variant of the Miles (1930) test, in which they were instructed to form a small triangle-shaped gap between their thumbs and index fingers before outstretching their arms and fixating upon the researcher through the gap. The researcher was then able to observe which eye participants aligned with the gap, indicating eye dominance. Subjects were then sat in a chair directly in front of Dell 21" CRT monitor and fitted with the eye tracking headset, with an eye tracking camera placed under the dominant eye and focussed using SR Research's *Eyelink* software on the secondary PC. Participants then underwent a calibration process, in which they

Figure 6.2: An image set containing brand logos hypothesized to carry 'working-class' (*Fiat*) and 'middle-class' (*Mercedes-Benz*) connotations, determined via a norming task (Experiment 2)

were requested to focus upon a series of dots appearing on-screen. Once the apparatus had been successfully calibrated, the first image set was triggered by the researcher, with the subject being presented with the visual and corresponding auditory stimuli.

Auditory stimuli were composed of 11 complete sentences. In order to make the stimuli sound more naturalistic, it was decided not to splice target words into their carrier sentences, but to record each sentence separately. As these were recorded from two different speakers, it was found necessary to align the dataset both from the onset of the trials, and from the mean onset of the target words. This gave two separate sets of results for both objects and brands – one which showed listener bias towards the targets from the start of the trial (including the first 1,000ms before the onset of speaker voice), and one which showed listener bias slightly before and after the mean onset of the target words. Target words were monosyllablic, with an average duration of approximately 500ms. Auditory stimuli were presented in a between-subjects design in order to prevent participants from being exposed to any given image

set more than once, controlling for potential salience effects. Each group was presented with the same image sets, but with opposing auditory data. For example, the first group was shown the image set containing the spoon and the gun (figure 6.1) while hearing auditory data recorded from the working-class male, while the second group was shown the same image set while a recording of the middle-class male was played. In order to ensure that each participant was exposed to multiple voices, however, the first group were also shown image sets while recordings of the middle-class speaker were presented. In these cases, the second group were presented with the same image sets while hearing the working-class speaker. Six different randomized orders were utilized in order to control for fatigue effects, as it was anticipated that participant responses could differ depending on whether an image set was encountered earlier or later in the experiment.
Participants were tasked with verbally indicating which of the four images in each set they most strongly associated with the target words heard in the auditory stimuli. Each image set was displayed for a total of 7,000ms, with auditory stimuli commencing from 1,000ms. Between image sets, participants were tasked with focusing upon a dot which appeared in the centre of the screen, with which the researcher could confirm that calibration remained accurate, make corrections if necessary via the secondary console, before triggering the next image set. At the halfway point of the experiment (after 48 image sets had been displayed), another full calibration process utilizing a series of on-screen dots was carried out. At this point, participants were asked if they were comfortable, wanted to take a break, and were happy to continue, before the latter half of the experiment commenced. The experiment lasted around 25 minutes, in total. Upon completion, subjects were thanked for their time and contribution before being paid a £3 participation fee.

6.2.4 Data Conversion

The raw fixation data (containing the time course of each participant's eye movements in relation to the 96 image sets) were outputted from SR

Research's *Eyelink* software, before being converted, collated, and filtered using a custom *Perl* script and *Java* filter created by Dr. Christoph Scheepers. This allowed the relevant fixation data and metadata to be extracted in a format suitable for analysis. During this process, trials were paired with 8-bit colour-coded image templates corresponding to the visual stimuli, which allowed the *Java* filtering program to assign participant fixation coordinates to the positions in which 'working-class', 'middle-class', and distractor images appeared during each trial.

Distractor images were found to have been explicitly chosen in negligible proportions (2.4% of all responses, or in 68 instances across 2,016 trials) as they bore little or no semantic relationship with the target words in the auditory stimuli. For this reason, it was decided to exclude them from the analyses of both the verbal choices and eye tracking data. This allowed for a logarithmic ratio of looks towards working-class images versus looks towards middle-class images to be calculated, in which a positive value represented visual bias towards a working-class image and a negative value represented visual bias towards a middle-class image (with a zero value representing no visual bias). This ratio, indicating participant bias towards either working or middle-class images across image sets containing either objects or brand logos, was then calculated across 50ms time bins, before the data were collated and restructured for statistical analysis.

For the eye tracking data, statistical bootstrapping provided the most robust analysis of the sample population. Statistical bootstrapping, introduced by Efron (1979), provides a viable compromise to sampling an entire population by means of drawing repeated samples from a given dataset, which gives a 'surrogate population for the purpose of approximating the sampling distribution of a statistic' (Singh & Xie 2010: 46). As this type of analysis is non-parametric in nature, it can better handle non-normally distributed data (such as fixation coordinates over time) as it does not rely on assumptions about the characteristics or structure of the sample population. In this case, 5,000 random resamples were drawn from the original dataset. This allowed for the calculation of robust 95% confidence intervals for the difference of the means, providing a visual measure of statistical significance. Fixation behaviour was visualised via line graphs, with datapoints representing aggregated fixations towards/away from working-class target images versus middle-class target images in each 50ms time bin. Responses were aligned to the mean onset of target words in the auditory stimuli.

Participants' verbal choices of image sets were analysed using Generalized Estimating Equations (GEE). As distractors were excluded from the analysis, listener responses were narrowed down to a binary choice between 'working-class' and 'middle-class' images for each trial, making GEE a suitable choice of statistical model. GEEs are also semi-parametric, making them more suitable for dealing with non-normally distributed data, such as the verbal responses given by listeners in relation to the stimuli used here.

One weakness of both GEE and statistical bootstrapping is that neither technique allows for the inclusion of random factors. In order to compensate for this, each technique was run on their respective datasets using both subjects and image sets as the independent variable. This provided two sets of analyses for both the on-line and off-line data – a by subjects analysis and by image sets analysis for the verbally recorded data, and a by subjects analysis and by image sets analysis for the eye tracking data.

6.3 Results

6.3.1 Generalised Estimating Equations

GEEs were used to analyse listeners' verbal choices of images during the experiment. A by subjects GEE analysis (table 6.1) revealed a non-significant ($p=.073$) main effect of speaker on the images chosen by participants across all image sets (brands and objects). This was in addition, however, to a highly significant ($p <.001$) effect of brands vs. objects (Igroup). Finally, a significant interaction between speaker and image set type ($p=.024$) reflects the differences in listener choices of images while viewing image sets containing brand logos and those depicting objects. Pairwise comparisons under this model (table 6.2) revealed a non-significant ($p=.247$) effect of speaker heard on image chosen while viewing image sets containing brand logos, but

Source	Type III		
	Generalized Score Chi-Square	df	Sig.
(Intercept)	10.317	1	.001
Speaker	3.225	1	.073
Igroup	19.678	1	.000
Speaker * Igroup	5.072	1	.024

Table 6.1: GEE by subject model effects, showing a highly significant (<.001) effect of image set type (Igroup) and a significant (p=.024) interaction of speaker and image set type on the verbal image choices reported by listeners (Experiment 2)

a significant effect (p=.008) of speaker heard on image chosen while viewing image sets containing objects.

A GEE carried out by image set (table 6.3, p.118), rather than by subject, revealed a non-significant effect of speaker (p=.097) on the images chosen by participants. The effect of image set type (brands vs objects) was also non-significant (p=.073). There was a highly significant (p=.004) interaction of speaker and image set type, however, indicating a disparity between speaker effects while viewing image sets depicting objects and speaker effects while viewing image sets containing brand logos. Pairwise comparisons revealed non-significant (p=.097, p=.073) effects of images chosen by speaker and by image set type, respectively. A highly significant (p=.004) effect, however, was found on listener choices when both speaker and image set type were taken into account, again illustrating the difference in listener responses to working-class and middle-class speakers while viewing image sets containing objects and those containing brand logos (illustrated in figures 6.3 and 6.6).

6.3.2 Objects

Figure 6.3 (p.119) shows participants' verbal responses in response to image sets containing objects, with 95% confidence intervals providing a visual measure of statistical significance. Here, speaker voice was found to have had

(I) Speaker*Igroup	(J) Speaker*Igroup	Mean Difference (I-J)	Std. Error	df	Sig.	95% Wald Confidence Interval for Difference	
						Lower	Upper
[Speaker=MC]*[Igroup=BRAND]	[Speaker=MC]*[Igroup=OBJ]	-.06	.032	1	.070	-.12	.00
	[Speaker=WC]*[Igroup=BRAND]	.04	.030	1	.247	-.02	.09
	[Speaker=WC]*[Igroup=OBJ]	-.17[a]	.033	1	.000	-.23	-.11
[Speaker=MC]*[Igroup=OBJ]	[Speaker=MC]*[Igroup=BRAND]	.06	.032	1	.070	.00	.12
	[Speaker=WC]*[Igroup=BRAND]	.09[a]	.028	1	.001	.04	.15
	[Speaker=WC]*[Igroup=OBJ]	-.11[a]	.043	1	.008	-.20	-.03
[Speaker=WC]*[Igroup=BRAND]	[Speaker=MC]*[Igroup=BRAND]	-.04	.030	1	.247	-.09	.02
	[Speaker=MC]*[Igroup=OBJ]	-.09[a]	.028	1	.001	-.15	-.04
	[Speaker=WC]*[Igroup=OBJ]	-.21[a]	.042	1	.000	-.29	-.12
[Speaker=WC]*[Igroup=OBJ]	[Speaker=MC]*[Igroup=BRAND]	.17[a]	.033	1	.000	.11	.23
	[Speaker=MC]*[Igroup=OBJ]	.11[a]	.043	1	.008	.03	.20
	[Speaker=WC]*[Igroup=BRAND]	.21[a]	.042	1	.000	.12	.29

Table 6.2: GEE pairwise comparisons by subject, showing a significant (p=.008) effect of speaker heard on image choices while viewing image sets depicting objects (Experiment 2)

Source	Type III		
	Generalized Score Chi-Square	df	Sig.
(Intercept)	2.709	1	.100
Speaker	2.756	1	.097
Igroup	3.204	1	.073
Speaker * Igroup	8.153	1	.004

Table 6.3: GEE by image set model effects, showing a highly significant (p=.004) interaction between image set type (Igroup) and speaker heard on the images verbally chosen by listeners (Experiment 2)

(I) Speaker*Igroup	(J) Speaker*Igroup	Mean Difference (I-J)	Std. Error	df	Sig.	95% Wald Confidence Interval for Difference	
						Lower	Upper
[Speaker=MC]*[Igroup=BRAND]	[Speaker=MC]*[Igroup=OBJ]	-.04	.072	1	.539	-.19	.10
	[Speaker=WC]*[Igroup=BRAND]	.04	.027	1	.174	-.02	.09
	[Speaker=WC]*[Igroup=OBJ]	-.16[a]	.065	1	.014	-.29	-.03
[Speaker=MC]*[Igroup=OBJ]	[Speaker=MC]*[Igroup=BRAND]	.04	.072	1	.539	-.10	.19
	[Speaker=WC]*[Igroup=BRAND]	.08	.073	1	.274	-.06	.22
	[Speaker=WC]*[Igroup=OBJ]	-.11[a]	.040	1	.004	-.19	-.04
[Speaker=WC]*[Igroup=BRAND]	[Speaker=MC]*[Igroup=BRAND]	-.04	.027	1	.174	-.09	.02
	[Speaker=MC]*[Igroup=OBJ]	-.08	.073	1	.274	-.22	.06
	[Speaker=WC]*[Igroup=OBJ]	-.20[a]	.066	1	.003	-.33	-.07
[Speaker=WC]*[Igroup=OBJ]	[Speaker=MC]*[Igroup=BRAND]	.16[a]	.065	1	.014	.03	.29
	[Speaker=MC]*[Igroup=OBJ]	.11[a]	.040	1	.004	.04	.19
	[Speaker=WC]*[Igroup=BRAND]	.20[a]	.066	1	.003	.07	.33

Table 6.4: GEE pairwise comparisons by image set, showing a highly significant (p=004) effect of speaker heard on the images verbally chosen by listeners while viewing image sets depicting objects (Experiment 2)

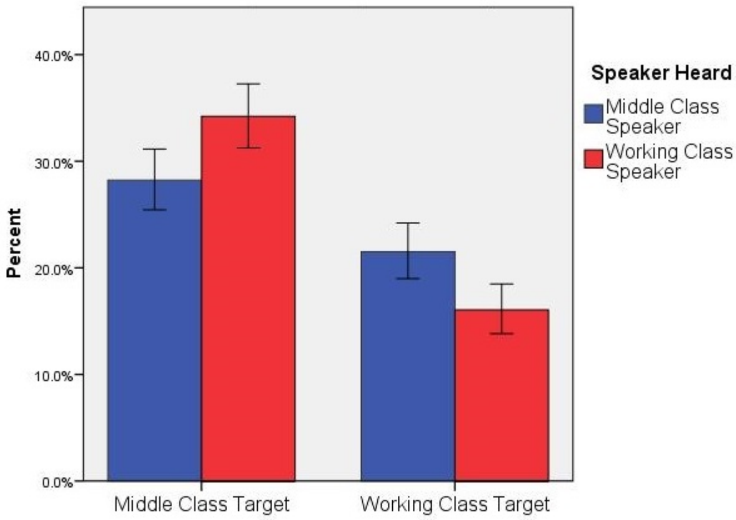


Figure 6.3: Images verbally chosen while viewing image sets containing objects, by speaker (95% C.I.) (Experiment 2)

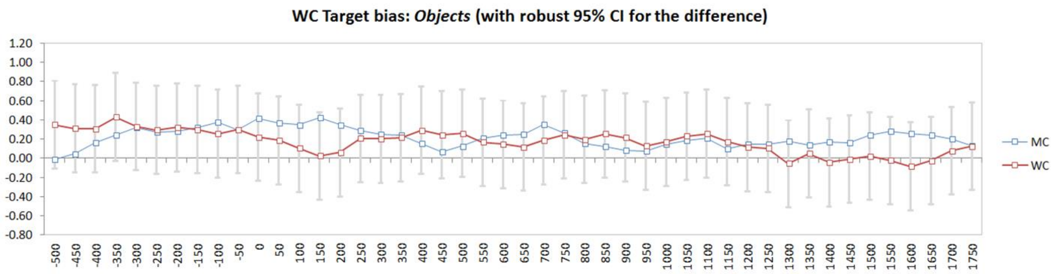


Figure 6.4: Time course of participant gazes towards 'working-class' objects in comparison to 'middle-class' objects, by speaker heard (by subject analysis, Experiment 2)

marked effects on the images verbally chosen by listeners. This, however, occurred in a class-incongruent direction – with listeners being significantly more likely to choose a 'middle-class' object when the working-class speaker was heard ($p<.05$), and significantly more likely to choose a 'working-class' object when the middle-class speaker was heard ($p<.05$). With regards to the eye tracking data, however, no significant effect was found. Figure 6.4 shows participant fixation bias towards/against 'working-class' images in trials containing depictions of objects. This bias was determined by excluding fixations towards distractors, which were found to have occurred in negligible proportions, before calculating a logarithmic ratio of looks towards working-class target images versus looks towards middle-class target images. This is represented here by the y-axis scale — with looks above the zero point indicating proportionately more looks towards working-class images and looks below the zero point indicating proportionately more looks towards the middle-class images. The x axis depicts the time course of fixations made across trials, sorted into 100ms time bins. Here, trials were synchronised to the onset of the target words, with the zero point on the x axis indicating the 'mean onset time of the target words heard during the experiment.

Here, we can see that listeners were immediately more inclined to look towards working-class images at the beginning of the trial, before any auditory stimuli was heard, although not significantly so ($p>.05$). Furthermore, analysis of listener fixations towards working-class target images upon hearing the auditory target words also revealed no significant ($p>.05$) effect of

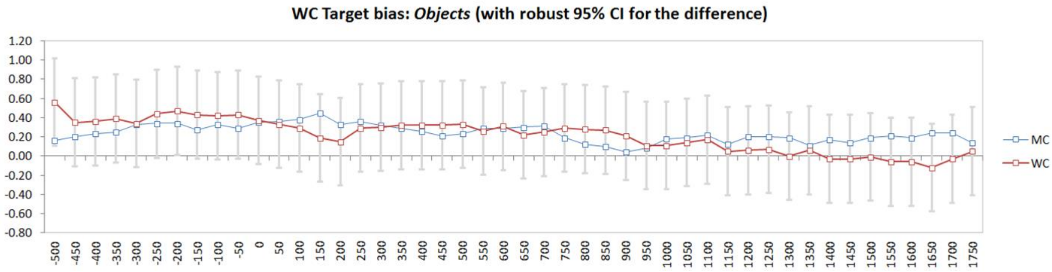


Figure 6.5: Time course of participant gazes towards 'working-class' objects in comparison to 'middle-class' objects, by speaker heard (by image set analysis, Experiment 2)

speaker heard. Furthermore, a virtually identical pattern was revealed in the 'by image set' analysis (figure 6.5).

From this, we can determine that hearing different speakers did not significantly (p>.05) impact upon the fixations made by listeners towards on-screen objects while hearing semantically related target words.

6.3.3 Brand Logos

Figure 6.6 shows the verbal choices of images participants made while viewing image sets containing brand logos. Here, clear trends emerge in the directions hypothesised – with listeners more inclined to choose 'middle-class' brand logos when the middle-class speaker was heard, and 'working-class' logos when the working-class speaker was heard. These trends, however, were not found to be statistically significant (p>.05).

Figure 6.7 shows participant fixation bias towards/against 'working-class' images in trials containing brand logos. As before, bias was determined by calculating a logarithmic ratio of looks towards working-class target images versus looks towards middle-class target images. This is represented here by the y-axis scale — with looks above the zero point indicating proportionately more looks towards working-class images and looks below the zero point indicating proportionately more looks towards the middle-class images. Trials were synchronised to the onset of the target words, with the zero point on the x axis indicating the ' mean onset time of target words heard during the

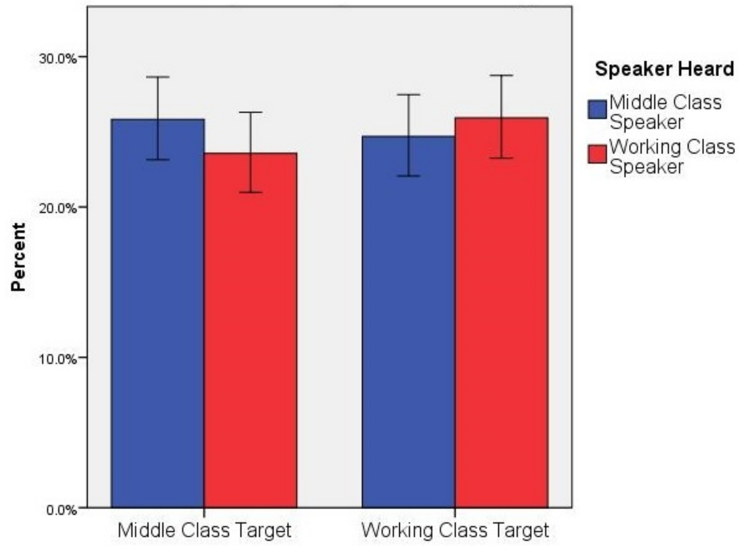


Figure 6.6: Images chosen while viewing image sets containing brand logos, by speaker (95% C.I.) (Experiment 2)

experiment.

Here we can see a significant (p<.05) effect of speaker voice emerge at two consecutive time-points — 1,100ms and 1,150ms after the mean onset of target words. Although listeners were more inclined to show bias towards 'working-class' brand logos regardless of speaker heard, they were significantly more biased towards 'working-class' brand logos when hearing a working-class speaker than when hearing a middle-class speaker. When the

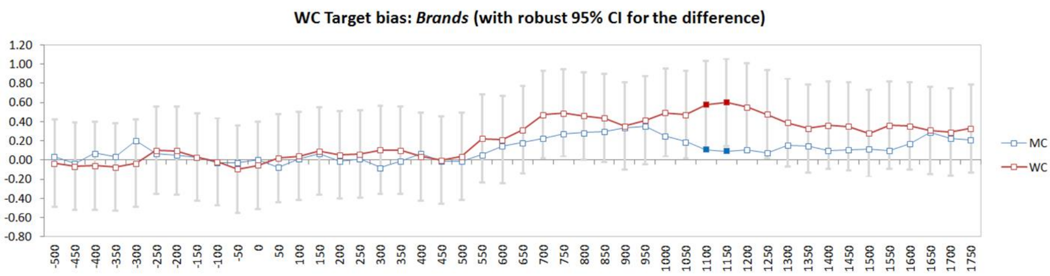


Figure 6.7: Time course of participant gazes towards 'working-class' objects in comparison to 'middle-class' objects, by speaker heard (by subject analysis, Experiment 2)

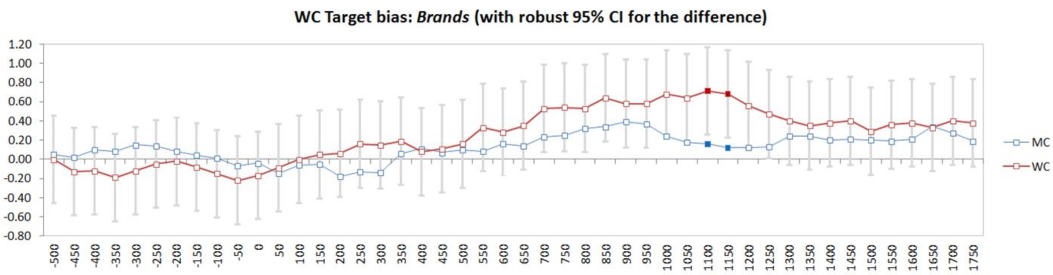


Figure 6.8: Time course of participant gazes towards 'working-class' objects in comparison to 'middle-class' objects, by speaker heard (by image set analysis, Experiment 2)

dataset was analysed by image set (figure 6.8), significance ($p<.05$) emerged in the very same time bins, showing marked effects of speaker voice not found elsewhere in the time course of the experiment.

These figures (6.7 and 6.8) show conclusively that the speaker heard had a significant ($p<.05$) effect on the images fixated upon by listeners, with listeners more likely to fixate upon a 'working-class' brand when a working-class speaker was heard than when a middle-class speaker was heard. Such divergence emerges at 1,100ms after the mean onset of the target words, continuing across the following time bin at 1,150ms. No such divergence was evident from 1,200ms onwards.

6.4 Discussion

The experiment found a significant ($p<.05$) effect of speaker voice on the explicit associations verbally reported by listeners when presented with image sets containing objects, but no such effect was found in participant eye movements across the same trials. While it is not known for certain why participants' explicit responses patterned in the opposite direction than was hypothesised — with listeners being significantly more inclined to choose 'working-class' objects when the middle-class speaker was heard, and 'middle-class' objects when the working-class speaker was heard — it is possible that listeners deliberately avoided negatively stereotyping the working-class speaker in choosing 'working-class' objects (such as a gun as opposed to a spoon, or a beer glass as opposed to a coffee mug), overcompensating by choosing more 'middle-class' targets when the working-class speaker was heard. Conversely, this may also have led them to choose more 'working-class' targets when the middle-class speaker was heard. This type of hypercorrection is outlined by Pantos and Perkins (2013: 13), who assert that:

> Listeners can hypercorrect their explicit attitude reporting if they suspect their implicit attitudes might reveal a socially unacceptable bias. Such hypercorrection in attitude reporting has been shown to occur when participants are concerned about perceptions of their self-presentation.

As these results were ostensibly explicit, conscious choices, deliberated over the course of several seconds, this explanation would seem applicable here. Although the implicit reactions indicated by the eye tracking data towards image sets containing objects revealed no significant effect of speaker voice, the difference in listeners' explicit choices on hearing different speakers suggests differences in the implicit and explicit associations made in response to the social information in the speech signal.

With regards to the brand logos, the explicit responses revealed slight trends in the directions hypothesised, with listeners more likely to choose 'middle-class' logos when the middle-class speaker was heard, and more likely to choose 'working-class' logos when the working-class speaker was heard. Although these trends were not found to be statistically significant ($p>.05$), the explicit results here mirror those obtained from the Experiment 1. Participant fixations towards image sets containing brand logos, however, show a significant ($p<.05$) effect of speaker voice, as hypothesised. This appears to indicate that social information in the speech signal is, indeed, evaluated implicitly, and that such implicit evaluation is separate from explicit evaluation. Furthermore, the effect first appears at 1,100ms after the average onset of the target words. Given that the average duration of the monosyllabic target words heard was around 500ms, and that it takes around 200ms for a saccade to be processed (cf. Arnold & Tinker 1939; Salthouse & Ellis 1980; Salthouse textitet al 1981; Vaughan 1983), this would suggest that listeners implicitly reacted to the semantic associations between the visual stimuli and the auditory target words with a delay of around 400ms. This result may imply that the time course of implicit cognition is longer (or slower) for social information derived from the speech signal than for visually-derived social information, where responses have been recorded occurring between 200 and 300ms (cf. Payne 2001; Greenwald et al 1998).

While it is not known exactly why there is an implicit effect of speaker voice in response to image sets containing brand logos but not in response to image sets containing objects, the findings from Duñabeitia et al (2009) may go some way to explaining these results. If, as Duñabeitia et al (2009: 209) suggest, 'abstract and concrete words differ in the way that they are represented in semantic memory: associated concepts are more readily available for abstract than for concrete words.', it may be that listeners are quicker to associate the target words with visual representations of abstract concepts (brand logos) than with visual representations of concrete items (objects) – resulting in an implicit effect for the former, but not the latter. It may also be possible that brand logos trigger more immediate responses due to their abstractness, as abstract concepts are open to a variety of interpretations (e.g. a Ford logo might cause people to think of a transit van or a rally car, depending on the perceiver, whereas an image depicting a transit van is open to less varied interpretations). Nevertheless, aggregated participant ratings in a subsequent norming task (Table 7.6, p.139) demonstrate a degree of consistency in the socio-economic connotations which people infer from different brand logos.

Chapter 7

Experiment 3 - Listener Fixations Upon Hearing Different Socially-Marked Phonetic Variants

7.1 Introduction

While the results of Experiment 2 indicate that social accents trigger differing fixation behaviours and verbal responses in listeners, the small number of speakers used in the auditory stimuli (one working-class and one middle-class Glaswegian male, along with two female distractor voices) provide limited evidence for this effect. Furthermore, the previous experiment examined only responses to a holistic notion of 'accent', with no examination of the specific components which listeners responded to. With this in mind, a new eye tracking experiment was devised in order to investigate the effect of socially-marked phonetic variation on the socio-economic associations which listeners make towards different social accents. For this experiment, auditory stimuli were recorded from 8 Glaswegian speakers (4 working-class and 4 middle-class males), consisting of mono-trisyllabic single word tokens containing socially-marked CAT, post-vocalic/post-consonantal /l/, and non-prevocalic

/r/ variation. New visual stimuli were composed of 36 image sets depicting brand logos (omitting depictions of objects, based on the findings of the previous experiment), each containing a 'working-class' and a 'middle-class' brand semantically paired with target words in the auditory stimuli.

7.2 Method

7.2.1 Participants

54 native Glaswegian participants were selected for inclusion in the analysis from a total of 60 participants tested, recruited via the University of Glasgow's psychology department subject pool, as well as through emails circulated by departmental secretaries and posters placed in and around campus. Participants were primarily students from a range of subject areas, although no record was taken of the subjects each participant studied and which were non-students (a point to bear in mind for future research). The 6 participants not selected (the last 6 tested) were excluded for the purposes of keeping the experimental design balanced in a Latin square[1], with 54 participants ensuring that responses to each of the 8 stimuli voices (and 1 distractor voice) could be recorded in relation to each image set a total of 6 times. Among participants included in the analysis, 28 were female (51.8%), with ages ranging from 18 to 61 years old (M=25.8, SD=9.9).

7.2.2 Materials

Auditory Stimuli: Target words (table 7.1) for the auditory stimuli were selected on the basis of containing both semantic relationships with the categories represented by target images in the visual stimuli, and possessing the potential for socially-marked phonetic variation in post-vocalic realisations

[1] A Latin square can be described as a grid filled with different symbols, each occurring only once in each row and once in each column. In experimental design, a Latin square can be used to balance stimuli across experimental conditions. In this case, it was used to ensure that each participant was exposed to each of the 9 speakers an equal number of times over the course of 36 image sets, and that the distribution of possible speaker utterance/image set combinations was split evenly between participants.

PHONEME	WORD	PHONEME	WORD	PHONEME	WORD
/a/	Gas	/l/	Wheel	/r/	Gear
/a/	Mechanic	/l/	Tipple	/r/	Tyre
/a/	Dash	/l/	Gulp	/r/	Car
/a/	HipFlask	/l/	Refill	/r/	Bar
/a/	Glass	/l/	Grill	/r/	Beer
/a/	Snack	/l/	Edible	/r/	Dinner
/a/	Sandwich	/l/	Meal	/r/	Hunger
/a/	Salad	/l/	Nibble	/r/	Fork
/a/	Napkin	/l/	Shelf	/r/	Order
/a/	Bag	/l/	Till	/r/	Shirt
/a/	Pack	/l/	Retail	/r/	Store
/a/	Scan	/l/	Sale	/r/	Cashier

Table 7.1: Target words in auditory stimuli, by phonetic variable (Experiment 3)

of /l/, /r/, and the CAT vowel. Each token was categorised according to the perceived articulations which speakers made while producing the variables under study (post-vocalic/post-consonantal /l/, non-prevocalic /r/, and the CAT vowel). Post-vocalic/post-consonantal /l/ and non-prevocalic /r/ tokens were coded auditorily, with the experimenter classifying each realisation according to four point scales, while CAT vowel realisations were categorised in terms of frontness/retractedness according to relative F2 measurements. The preceding and following phonetic environments of each variable were also coded for inclusion in later analyses.

Target words were chosen on the basis of being semantically linked to one of four categories (cars, restaurants, shops, and drink), and for their inclusion of phonetic contexts where the socially-marked phonetic realisations under examination were possible. While a metric of the strength of the semantic associations between the target words and their corresponding categories would have been useful, with perhaps the only method to obtain this being a preliminary norming task, this was not found to be practical as there is a limit to how many words containing non-prevocalic /r/ contexts, for example, that can realistically be semantically linked to brand logos conveying differing socio-economic contexts. Auditory tokens from a synthesized voice was obtained from Dr. Christophe Veaux of the University of Edinburgh's

Institute of Language, Cognition and Computation.

To provide greater ecological validity, it was originally intended that auditory stimuli from Glaswegian speakers be collected via a pictogram task, recording two speakers at a time as they participated in a spot-the-difference activity and extracting the required tokens from their recorded conversations, but this was found to be impractical due to the number of speakers required to provide useful stimuli for the experiment. Furthermore, as the list of target words was drawn up with consideration to both semantic relationships with categories in the visual stimuli and potential for socially-stratified phonetic variation, some were perhaps too abstract for a pictogram task (words such as *hunger, mile,* and *scan,* for example, being particularly tricky to elicit with images). With this in mind, a word association task was devised in which single participants were tasked with guessing words, with the first letter of each word and semantically related clues given to elicit the desired responses. Participants were instructed to repeat each target word 3 times, as it was found that they would often produce the first instance of words with a rising intonation (being unsure if they had guessed the word correctly). Participants were informed when guesses were incorrect and asked to try again. If this failed to produce the intended target, speakers were given additional letters for the missing word until a successful utterance was elicited. A total of nineteen male speakers were recorded, from which four self-reported working-class and four self-reported middle-class speakers, with ages ranging from 18-29 years old (Table 7.2), were selected on the basis of sounding most prototypically working or middle-class.

Female speakers were not recorded as the experimental design was already complex, and time constraints were such that the addition of another variable (speaker gender) would have been impractical. The task was found to have been successful in reliably eliciting the socially-marked phonetic variants under examination from self-reported middle-class speakers, and from some of the self-reported working-class speakers. Several of the self-reported working-class speakers were found to have produced variants thought to be typical of middle-class, or more standard, speech. While this may have resulted from the word association task itself, and its resemblance to a word list

Speaker Codename	Age	Home Region	Social Class (self-reported)
WC1	24	Thornliebank	Working Class
WC2	28	Anderston	Working Class
WC3	21	Riddrie	Working Class
WC4	19	Pollock	Working Class
MC1	31	Bearsden	Middle Class
MC2	29	Barrhead	Middle Class
MC3	21	Cathcart	Middle Class
MC4	21	Helensburgh	Middle Class
S1	23	Edinburgh	Synthetic voice

Table 7.2: Speakers used as auditory stimuli in eye tracking task (Experiment 3)

designed to elicit read speech, the recording environment (a formal task conducted in a sound-proofed recording booth) and the level of higher education which the speakers possessed (being primarily undergraduate students at the University of Glasgow) may have contributed to speakers adopting a register closer to the prestige norm of Scottish Standard English. The task, however, was found to have elicited the expected variants from other working-class speakers, so can be said to have been successful in this regard.

All speakers were native to Glasgow, with the exception of the synthetic stimuli voice —which had been resynthesized from a 23 year old male speaker from Edinburgh. Of the Glaswegian speakers selected for inclusion as stimuli, the 4 who self-identified as working-class had a mean age of 23 years, and the 4 who self-identified as middle-class a mean age of 25.5 years. Tokens from the synthetic voice were included in the experiment as distractors, with the purpose of disguising the task as investigating differences in listener reactions while hearing both real and synthetic voices. It was thought that not explicitly mentioning the synthetic voice would lead participants to believe that it was an important part of the experiment. This, however, proved not to be the case, as although some participants (11.6%) commented that the synthetic voice was either computer generated or had been manipulated during the following Subjective Reaction Test, no participant explicitly mentioned the synthetic voice when asked to state the purpose of the experiment once testing had concluded. In hindsight, it may have been more effective to have falsely advised participants that the experiment was focussed on synthetic speech before testing began.

No working-class speakers were found to have produced the working-class-typical variants for every token and some middle-class speakers produced some working-class prototypical variants. This is in line with previous sociolinguistic research, which shows that phonological variation according to sociolect is rarely categorical (Macafee 1994), and allows for a comparison of the effect which the realisations themselves had on listener associations independently from the self-reported social classes of the speakers heard. If, for example, it was found that working-class speakers trigger certain reactions in listeners which middle-class speakers do not, and that this happens regardless of whether the speech heard contains typical working-class phonetic variants or not, then this would indicate that implicit associations are triggered by other socially encoded linguistic information (such as voice quality). In order to investigate this, the most prominent voice qualities of each speaker were also auditorily coded for later analysis.

CAT Vowel Realisations: Socially stratified productions of the CAT vowel in Scottish English have been noted at least as early as Macualey (1977), who found working-class speakers to generally produce more retracted variants than middle-class speakers, with such productions for all speakers retracted before approximants such as /r/. In a study of different Communities of Practice (CofP) in a Glasgow secondary school, Lawson (2011: 244) found clear social stratification of the CAT vowel based on peer-group, with members of the 'Ned' CofP producing more fronted and lowered realisations, and members of the 'Schoolie' CofP more raised realisations, than other peer-groups in the school. This is in line with Stuart-Smith (1999), who suggests that middle-class realisations of CAT tend to be more raised than working-class realisations.

Acoustic analysis was conducted on CAT productions in the auditory stimuli, with F1 and F2 measurements taken from static mid-points on each vowel in *Praat*, using the program's 'track formants' feature before visu-

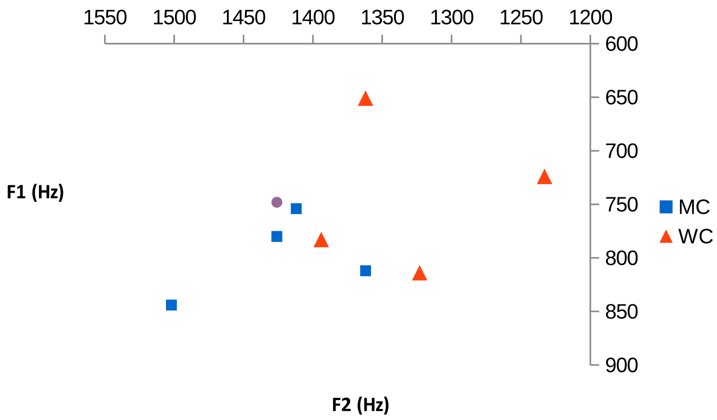


Figure 7.1: Formant plot of stressed /a/ in speaker productions of *pack* tokens only. Working-class realisations are red triangles, middle-class speaker realisations are blue squares, the token from the synthesized voice is a purple circle (Experiment 3)

ally verifying the formant tracks in each spectrogram. In order to examine fixations made upon hearing different CAT realisations, it was found necessary to convert speaker vowel productions into discrete categories. For this, speaker CAT vowel productions were sorted into fronter (stereotypically more working-class) and more retracted (stereotypically more middle-class) categories based on the F2 values of all stressed /a/ realisations in the auditory stimuli. The mean F2 frequency of all CAT vowel realisations was found to be 1,356Hz, with a median F2 of 1,412Hz among middle-class speakers and 1,290Hz among working-class speakers. With this in mind, realisations were sorted into fronter (1,400Hz or higher) and more retracted (1,300Hz or lower) categories, with an intermediate 'neutral' category (1,300Hz-1,400Hz) serving as a buffer between the two.

Various methods of vowel normalisations were considered, but were rejected due to the similarity of speakers in the auditory stimuli (all adult males) and due to there being only one vowel under examination. While there were invariably differences in the vocal tract sizes of different speakers, it was felt that the raw F2 frequency data were sufficient for preliminary

Speaker	Retracted	Neutral	Fronted
MC1	3 (25%)	3 (25%)	6 (50%)
MC2	3 (25%)	2 (16.7%)	7 (58.3%)
MC3	1 (8.3%)	2 (16.7%)	9 (75%)
MC4	3 (25%)	2 (16.7%)	7 (58.3%)
S1	0	0	12 (100%)
WC1	3 (25%)	5 (41.7%)	4 (33.3%)
WC2	11 (91.7%)	0	1 (8.3%)
WC3	1 (8.3%)	7 (58.3%)	4 (33.3%)
WC4	5 (41.7%)	4 (33.3%)	3 (25%)

Table 7.3: CAT vowel realisations by speaker (Experiment 3)

analysis.

Post-Vocalic/Post-Consonantal /l/ Realisations: While varieties of Scots have long contained dialectal forms of /l/ vocalisation, primarily following /ɔ/ in words such as *ball* and *fall* and following /ʉ/ in words such as shoulder (Macafee 1983), a relatively recent innovation has arisen among Glaswegian vernacular speakers which is more akin to the type of /l/ vocalisation found in working-class Cockney and South-East London English (Stuart-Smith *et al* 2006). This newer type of /l/ vocalisation in Glasgow appears post-vocalically following front vowels in both word-final and pre-consonantal positions (in words such as *well* and *milk*), as well as post-consonantly (in words such as *people*), and has been shown to occur much more frequently among younger working-class speakers than older working-class speakers or middle-class speakers of any age, making the variant a clear marker of both age and social class (Stuart-Smith *et al* 2006). Acoustically, laterals are generally characterised by a low F1 and dark F2, with a raised F1 and lowered F2 when dark, and a higher F3 when 'strongly dark and/or denti-alveolar' (Stuart-Smith *et al* 2015). In vernacular Glaswegian, /l/ is typically denti-alveolar and very dark, while another variant which has been observed from the 1980s vocalises to 'a high back (un)rounded vowel in syllable-final position' (Stuart-Smith *et al* 2015: 1).

Coding /l/ tokens according to these categories was carried out auditorily according to strongly vocalised, weakly vocalised, dark, and clear /l/ realisations. Some vocalised tokens were found to be perceptually 'stronger' than others, and were coded accordingly. This may have been due to differences in duration, and future analyses are planned to account for this. A range of perceptually-different dark /l/ pronunciations were also discovered, with dark /l/ being the most commonplace post-vocalic/post-consonantal realisation in Glaswegian speech (Stuart-Smith *et al* 2015). In order to ensure that coding was consistent, 10% of all categorised /l/ tokens were verified by two additional phoneticians (Jane Stuart-Smith and Robert Lennon at the *Glasgow University Laboratory of Phonetics*).

Speaker	Strongly vocalised	Weakly vocalised	Dark	Clear
MC1	0	5 (41.7%)	6 (50%)	1 (8.3%)
MC2	0	0	6 (50%)	6 (50%)
MC3	2 (16.7%)	5 (41.7%)	5 (41.7%)	0
MC4	2 (16.7%)	2 (16.7%)	4 (33.3%)	4 (33.3%)
S1	0	4 (33.3%)	7 (58.3%)	1 (8.3%)
WC1	2 (16.7%)	3 (25%)	6 (50%)	1 (8.3%)
WC2	3 (25%)	2 (16.7%)	6 (50%)	1 (8.3%)
WC3	0	0	9 (75%)	3 (25%)
WC4	9 (75%)	2 (16.7%)	1 (8.3%)	0

Table 7.4: Post-vocalic/post-consonantal /l/ realisations by speaker (Experiment 3)

Hall-Lew & Fix (2012: 794) note that vocalised /l/ is 'a challenging variable to measure consistently', finding categorisations to vary markedly by rater after a task in which 53 linguists coded /l/ tokens according to degree of vocalisation on a four-point scale. While Hall-Lew & Fix (2012) focussed on ratings of the degree of /l/ vocalisation in spontaneous speech, this is mitigated to an extent in the current study as auditory stimuli were composed of single-word tokens which, as Stuart-Smith *et al* (2006) note, are more conducive to discriminating vocalised /l/ than casual speech. Furthermore, as the speakers' intended choice of words were known to the researcher, this removed potential ambiguities which may have arisen in distinguishing intentional back vowels from vocalised /l/ tokens, for example. The categorisation of vocalised versus non-vocalised /l/ tokens was also made simpler by coding vocalised tokens as either strongly or weakly vocalised, and other

/l/ tokens as either clear or dark. As can be seen from table 7.4 (above), most speakers produced dark /l/ realisations for each token. These included a range of dissimilar-sounding articulations, presenting an area for further investigation in future research.

Non-Prevocalic /r/ Realisations: From the turn of the century, studies have shown coda /r/ to have been weakened to a pharyngealised vowel among many working-class Glaswegian speakers (Romaine 1979; Macafee 1983; Johnston 1997). Conversely, a shift towards rhoticity was noted among middle-class speakers around the same time, with Lawson *et al* (2008: 102) noting that this may have been due to 'Ridicule of MC Anglo-Scottish accents in popular culture and an increase in nationalism', whereas the working-class 'loss of /r/ appeared to be a slow-moving, system-internal change, unconnected with Anglo nonrhoticity'. The trend towards nonrhoticity among young working-class Glaswegians has been observed to have increased greatly in recent years (Stuart-Smith 2003; Stuart-Smith *et al* 2007). In contrast, speakers of middle-class varieties of Glaswegian now tend to produce schwar and bunched-/r/ articulations in post-vocalic postitions (Stuart-Smith *et al* 2007; Lawson *et al* 2011; Lennon 2013). Acoustically, middle-class Glaswegian post-vocalic /r/ realisations, including retroflex and bunched realisations, show lowered F3, while uvular and dental trills show raised F3 (Stuart-Smith *et al* 2015). Working class realisations tend to show auditory weakening of non-prevocalic /r/, especially in utterance final position and unstressed syllables — for which little acoustic evidence exists. A small-scale study by Stuart-Smith (2007), however, suggests that these may be characterised by a high/rising F3. Although completely derhotic realisations present no audible cues to rhoticity, Lawson *et al* (2014) note that covert /r/ articulatory gestures are often common during their production. For stimuli tokens containing non-prevocalic /r/, coding was carried out auditorily, categorising realisations into derhotic, weakly rhotic, approximant/tap, and bunched /r/ categories (Table 7.5). As the /l/ realisations, 10% of all /r/ tokens were verified by two additional phoneticians.

Speaker	Derhotic	Weakly Rhotic	Tap or Approximant	Bunched
MC1	0	2 (22.2%)	6 (66.7%)	1 (11.1%)
MC2	0	1 (11.1%)	2 (22.2%)	6 (66.7%)
MC3	0	2 (22.2%)	4 (44.4%)	3 (33.3%)
MC4	1 (11.1%)	6 (66.7%)	2 (22.2%)	0
S1	1 (11.1%)	2 (22.2%)	5 (55.6%)	1 (11.1%)
WC1	0	5 (55.6%)	4 (44.4%)	0
WC2	0	2 (22.2%)	7 (77.8%)	0
WC3	0	4 (44.4%)	5 (55.6%	0
WC4	3 (33.3%)	4 (44.4%)	2 (22.2%)	0

Table 7.5: Non-prevocalic /r/ realisations by speaker, (Experiment 3)

Combined Tokens: Three stimuli tokens contained two socially-marked phonetic variants — *bar, car,* and *cashier*, all of which contain stressed /a/ and non-prevocalic rhoticity. It's worth noting, however, that productions of *cashier* varied between the working-class and middle-class speakers, with all but one of the middle-class speakers (MC1, MC2, MC3, and WC1) producing the token with a stressed /a/, and all but one of the working-class speakers (WC2, WC3, WC4, and MC4) producing the token with an unstressed initial vowel. This indicates that this type of variation is also socially marked in Glasgow. The analysis of combined tokens was also confounded by the co-articulatory effect of /ar/ realisations, with /a/ productions for all speakers retracted before approximants such as /r/. As such, these tokens were omitted from analysis. The omission of combined tokens left analysable auditory stimuli comprising 12 words containing CAT, 12 words containing post-vocalic/post-consonantal /l/ realisations, and 9 words containing non-prevocalic /r/ per speaker.

Voice Quality: Voice quality has also been found to generally be a differentiating factor between working and middle-class varieties of Glaswegian, with working-class Glaswegians being noted to utilise more whispery phonation and open jaw settings than their middle-class counterparts (Stuart-Smith 1999). Voice quality has also found to vary between different ages and genders of Glaswegian speakers, with males tending to utilise more creaky phonation than females, and younger speakers tending to have more lax settings than older speakers (Stuart-Smith 1999). Furthermore, Stuart-Smith (2003: 115) also found that there are 'a specific constellation of settings typical of working-class speakers (more open jaw, raised and retracted tongue body with possible retracted tongue root, whispery voice), which tended to be absent in middle-class speakers.'

Visual Stimuli: New sets of visual stimuli were compiled and normed for the experiment, comprising image sets containing brand logos relating to four different categories — cars, restaurants, shops, and alcohol. These categories were selected as they were thought to be strongly associated with socio-economic status, for which divergent connotations could be conveyed by different brand logos. Brands were pre-selected via a *Google Docs* feature which provided semantically generated lists from an initial input, with generated brands not found in Glasgow being manually replaced with brands local to the area. Logos corresponding to each of the resulting brands generated/selected were then obtained online, via the *Brands of the World*[2] website, as well as from Google image searches where logos were otherwise unavailable. Vector images were obtained where possible, as these can be scaled up or down indefinitely without loss of image quality. High quality bitmap and jpeg images were obtained when vector graphic logos could not be found. All logos were normed via a social evaluation questionnaire (N=39) which consisted of brand logos above accompanying Likert scales on which raters were tasked with indicating 'how posh' they thought each brand was on a scale of one to six (Appendix 4, p.238). Norming was conducted primarily on students from the University of Glasgow. While this may have affected ratings, the sample for the norming task was drawn from a similar population as the sample for its corresponding eye tracking task. Ratings were gathered for 96 brand logos, with questionnaires presented in five different randomised orders in order to control for possible fatigue effects. Participant ratings for each brand were collated and converted to participant-specific z-scores, which

[2]www.brandsoftheworld.com [accessed 08/04/14]

Figure 7.2: Image set showing a working-class brand (Aldi) and middle-class brand (Marks & Spencer), paired with the auditory token *store* (Experiment 3)

were then used to determine whether a brand had been classified as more 'working-class', 'middle-class', or neither, depending on whether or not the brand z-score was greater than 0.1 (for 'middle-class' brands) or less than -0.1 (for 'working-class' brands) above zero. This produced a total of 41 'working-class' brands, 44 'middle-class' brands, and 11 brands with z-scores close to 0, as detailed in table 7.6 (overleaf).

Image sets were compiled based on the difference between the z-scores of the rated logos, with middle-class brands which were rated as the most 'posh' in the norming task being paired with brands which scored in the upper-end of the 'working-class' category. This allowed for image sets containing a clear 'working-class' and 'middle-class' brand for each set, for example in figure 7.2. While there may have been disparities in the ratings given to different brands by individual participants, the aggregated ratings collected for the norming task (Appendix 5) demonstrate a degree of consistency in the socio-economic associations which subjects derived from different brand logos.

Equipment

IMAGE SET	CATEGORY	WC TARGET IMAGE	MEAN WC IMAGE RATING	MEAN WC IMAGE Z RATING	MC TARGET IMAGE	MEAN MC IMAGE RATING	MEAN MC IMAGE Z RATING	MEAN Z SCORE DIFFERENCE
1	Car	Citreon	3.13	-0.07	BMW	5.00	1.35	**1.42**
2	Car	Peugeot	3.15	-0.05	Porsche	5.05	1.41	**1.46**
3	Car	SEAT	3.13	-0.04	Mercedes-Benz	5.15	1.46	**1.50**
4	Car	Ford	3.18	-0.02	Jaguar	5.28	1.58	**1.60**
5	Car	Skoda	2.62	-0.42	Audi	4.82	1.19	**1.61**
6	Car	FIAT	2.72	-0.39	Bentley	5.77	1.93	**2.32**
7	Car	Kia	2.77	-0.34	Rolls Royce	5.90	2.04	**2.38**
8	Drink	Magners	2.82	-0.27	Glenfiddich	4.15	0.71	**0.98**
9	Drink	Strongbow	1.85	-0.99	Hardys	3.36	0.09	**1.09**
10	Drink	Glen's Vodka	1.90	-0.98	Whyte & Macka	3.36	0.11	**1.09**
11	Drink	Carlsberg	2.51	-0.52	Grey Goose	4.05	0.62	**1.14**
12	Drink	Fosters	2.28	-0.69	Leffe	3.90	0.51	**1.20**
13	Drink	Buckfast	1.10	-1.61	Jim Beam	3.23	0.02	**1.63**
14	Drink	Tennants	2.08	-0.85	Laphroaig	4.74	1.14	**1.99**
15	Food	Toby Carvery	2.26	-0.71	Pizza Express	3.67	0.36	**1.06**
16	Food	Wetherspoon's	2.31	-0.68	Wagamama	3.74	0.40	**1.08**
17	Food	Brewer's Fayre	2.36	-0.64	Bella Italia	3.82	0.44	**1.08**
18	Food	Subway	2.31	-0.68	La Tasca	3.77	0.42	**1.09**
19	Food	Nandos	2.92	-0.21	Pret a Manger	4.38	0.89	**1.10**
20	Food	Dominos	2.36	-0.63	EAT	3.82	0.48	**1.11**
21	Food	Harry Ramsden	2.64	-0.45	Café Rouge	4.18	0.71	**1.16**
22	Food	McDonalds	1.49	-1.29	TGI Fridays	3.08	-0.10	**1.19**
23	Food	Pizza Hut	2.38	-0.61	Jamie's Italian	4.13	0.69	**1.30**
24	Food	Burger King	1.69	-1.15	Yo! Sushi	3.44	0.17	**1.32**
25	Food	KFC	1.72	-1.12	Costa	3.51	0.23	**1.34**
26	Food	Greggs	1.72	-1.11	Starbucks	3.59	0.28	**1.40**
27	Shop	Matalan	2.31	-0.68	Debenhams	3.95	0.57	**1.25**
28	Shop	Primark	1.49	-1.28	River Island	3.51	0.24	**1.51**
29	Shop	LIDL	1.59	-1.21	Sainsburys	3.62	0.31	**1.52**
30	Shop	Aldi	2.03	-0.89	Marks & Spence	4.28	0.81	**1.70**
31	Shop	ASDA	2.33	-0.65	Waitrose	5.00	1.31	**1.96**
32	Shop	TK Maxx	2.36	-0.65	House of Fraser	4.97	1.32	**1.96**
33	Shop	B&M	1.74	-1.12	John Lewis	4.62	1.05	**2.16**
34	Shop	Poundland	1.72	-1.16	Peckhams	4.62	1.06	**2.22**
35	Shop	Farmfoods	1.46	-1.32	Co-op	3.05	-0.11	**1.21**
36	Shop	Iceland	1.49	-1.29	H&M	3.00	-0.15	**1.15**

Table 7.6: Participant 'poshness' ratings of brands used in visual stimuli (Experiment 3)
'Working-class' brands are in red/pink, 'middle-class' brands are in blue

IMAGE SET	CATEGORY	WC TARGET IMAGE	MC TARGET IMAGE	DISTRACTOR 1	DISTRACTOR 2	WORD	PHONEME
1	Car	Citreon	BMW	Smirnoff	Bench	Gas	/a/
2	Car	Peugeot	Porsche	Vladivar	Acer	Wheel	/l/
3	Car	SEAT	Mercedes-Ben	Dunne's Store	Special K	Gear	/r/
4	Car	Ford	Jaguar	Morrisons	Clarks	Mechanic	/a/
5	Car	Skoda	Audi	Tesco	DNG	Tyre	/r/
6	Car	FIAT	Bentley	New Look	Fred Perry	Dash	/a/
7	Car	Kia	Rolls Royce	Thundercats	Lacoste	Car	/r/
8	Drink	Magners	Glenfiddich	Amazon	Lasenza	Tipple	/l/
9	Drink	Strongbow	Hardys	Renault	Lotto	Bar	/r/
10	Drink	Glen's Vodka	Whyte & Mack	Volkswagen	Prada	HipFlask	/a/
11	Drink	Carlsberg	Grey Goose	Nissan	Tapout	Gulp	/l/
12	Drink	Fosters	Leffe	Subara	Quiksilver	Beer	/r/
13	Drink	Buckfast	Jim Beam	Smart	Tommy Hilfige	Glass	/a/
14	Drink	Tennants	Laphroaig	Mazda	Wilson	Refill	/l/
15	Food	Toby Carvery	Pizza Express	Volvo	Mastercard	Dinner	/r/
16	Food	Wetherspoon	Wagamama	Mitsubishi	VISA	Snack	/a/
17	Food	Brewer's Fayr	Bella Italia	Stolichnaya	Zurich	Grill	/l/
18	Food	Subway	La Tasca	Bacardi	Dell	Hunger	/r/
19	Food	Nandos	Pret a Manger	Brewdog Punk	Intel	Sandwich	/a/
20	Food	Dominos	EAT	The Famous G	LG	Edible	/l/
21	Food	Harry Ramsde	Café Rouge	Hoegaarden	NEC	Fork	/r/
22	Food	McDonalds	TGI Fridays	Finlandia	Seimens	Salad	/a/
23	Food	Pizza Hut	Jamie's Italian	Russian Stand	Sonix	Meal	/l/
24	Food	Burger King	Yo! Sushi	Chivas Regal	NASA	Order	/r/
25	Food	KFC	Costa	Harley Davids	Assassin's Cre	Napkin	/a/
26	Food	Greggs	Starbucks	Lamborghini	Borrussia Dor	Nibble	/l/
27	Shop	Matalan	Debenhams	Land Rover	Dead Island	Shirt	/r/
28	Shop	Primark	River Island	Lexus	Call of Duty 3	Bag	/a/
29	Shop	LIDL	Sainsburys	Pioneer	Burberry	Shelf	/l/
30	Shop	Aldi	Marks & Spenc	Pirelli	Grand Theft A	Store	/r/
31	Shop	ASDA	Waitrose	America Onlin	Guitar Hero	Pack	/a/
32	Shop	TK Maxx	House of Frase	Facebook	Namco Banda	Till	/l/
33	Shop	B&M	John Lewis	Google	Playstation	Cashier	/r/
34	Shop	Poundland	Peckhams	Imon	Trivial Pursuit	Scan	/a/
35	Shop	Farmfoods	Co-op	Netflix	Chelsea FC	Retail	/l/
36	Shop	Iceland	H&M	Think	UEFA	Sale	/l/

Table 7.7: Image set/auditory target stimuli pairings (Experiment 3) 'Working-class' brands are in red/pink, 'middle-class' brands are in blue

Stimuli speakers were recorded in a soundproofed recording booth using a Sennheiser *MKH40-P48* pressure gradient condenser microphone connected to a desktop PC running *Audacity*. All auditory stimuli were recorded in mono at a sample rate of 44,100Hz, and normalized to +10dB. Eye tracking was conducted using an SR Research *Eyelink II* headset connected to two desktop computers one running SR Research's *Eyelink* software, which the experimenter used as a control console to calibrate and monitor the eye tracking equipment, and the other used to run SR Research's *Experiment Builder* software, which cued and displayed stimuli to participants and recorded fixation data. Visual stimuli were presented via a 21" *Dell* CRT display screen with attached sensors to detect participant head movement, while auditory stimuli were relayed via a Dell *5650* 5.1 surround sound system. Only two (left and right) speakers were utilized during the experiment, placed either side of the display screen (at a fixed distance from the chair where participants were sat during the experiment), with volume kept at a constant 25% of the maximum system volume in order to ensure that each participant was subjected to comparable volume levels throughout testing.

7.2.3 Procedure

For the Visual World experiment, participants were first told that the purpose of the experiment was to investigate the associations that people make between spoken words and images. Participants were then tested for eye dominance using a variant of the Miles test (outlined on p.112) and asked to sit in front of the computer monitor with speakers positioned at either side. Following this, participants were fitted with an *Eyelink II* eye tracking headset, with an eye tracking camera positioned under each participant's dominant eye. The camera was then focussed, and an eye tracking calibration process carried out using SR Research's *Eyelink* software. After the calibration process was successfully completed, participants were tasked with fixating upon a dot which appeared in the middle of the display monitor to begin the experiment. Participants were also instructed that they should select (with a mouse) the image in each set which they most strongly

Figure 7.3: Image set paired with target word *beer* in the *drink* category (Experiment 3)

associated with the target word heard in the corresponding auditory stimuli, and that this should be done as quickly as possible. Each image set was displayed for 1,000ms before category-relevant auditory tokens were played. Participants were given a total of 7,000ms to manually select a brand logo in each set, with image sets advancing after the 7 seconds had elapsed or when a mouse click was made (whichever came first). Mouse clicks were disabled until 3,000ms had elapsed, in order to prevent participants from advancing image sets before auditory tokens were heard and fixation behaviour towards them could be recorded. Stimuli tokens were manually paired with specific image sets, in order to ensure that equivalent semantic relationships were maintained — care was taken, for example, to pair the target word *beer* with an image set containing two brands of beer (figure 7.3) rather than a set containing a brand of beer and a brand of wine, or one containing a brand of vodka and a brand of cider (cider bearing more semantic similarity to beer than to vodka).

Nine different playlists containing the same image set/target word pairings were compiled, with target words uttered by different speakers in each playlist. Consecutive participants were presented with different playlists in a repeating pattern (e.g. the first participant was shown playlist one, the second shown playlist two, the ninth shown playlist nine, with the pattern repeating on the tenth participant until all 54 participants were tested). The order of image sets displayed was completely randomised for each participant, using *Experiment Builder*'s randomise function, in order to control for fatigue effects. Listener fixations were recorded via the *Eyelink* software. Following the experiment, participants were given a Subjective Reaction Test (Ch.8) before being briefed and payed a £6 participation fee.

Data Interpretation

As with the previous Visual World experiment, it was decided to aggregate participant fixation data into 100ms time bins across trials, whereupon the images primarily fixated upon by listeners during each timeslot could be determined.

The eye tracking output files were put through a filter program where fixation coordinates and trial information were extracted, saccades and fixations shorter than 80ms were excluded, blinks were added to previously occuring fixations, and the fixation data were paired with colour-coded image templates to encode the positions of the visual stimuli items in the dataset. The subsequent filtered files were then collated into a single dataset, before trial-specific information (speaker information, variants produced in each trial) was added for analysis.

Statistical analysis was conducted for fixations towards each image upon hearing each realisation of each variable, bootstrapping the data with 10,000 random resamples in each case. This allowed for the calculation of robust 95% confidence intervals, providing a visual measure of statistical significance corresponding to a p-value of .05.

7.3 Results

7.3.1 CAT Vowel Realisations

Examining responses to realisations of phonetic variables required a different approach from that used in the previous experiment — basing observations on time points corresponding to word onset, variable onset, and word end (marking the point where semantic information could definitely be processed), while also factoring in the time needed for fixations to have taken place (200ms for saccadic eye movement). This was adapted from a method utilised by Reinisch *et al* (2010), examining differences in fixation behaviour in order to determine the time-points in spoken words where stress (but not segmental information) could lead listeners to visually prefer semantically related on-screen words over semantically unrelated on-screen words. As the current experiment utilised two images — one target (class-congruent) brand logo and one competitor (class-incongruent) brand logo — which bore semantic relationships to a target word heard during each trial, as well as two semantically-unrelated distractor images, a level of adaptation was required. Here, fixations towards both working and middle-class target brands and distractor images were examined from the onset of auditory stimuli, with time points marked for the onset of the phonetic variables under examination and the mean duration of the target words containing those variables. This allowed for the examination of fixations immediately following different socially-marked realisations of the variables, as well fixations triggered by semantic information upon hearing target words. For example, the mean onset for stressed /a/ realisations was 195ms after the onset of target words, with a mean duration of tokens containing the CAT vowel of 532ms. Taking CAT onsets and word durations into account, critical time windows were calculated from 400ms to 700ms after the target word onset (the mean vowel onset plus 200ms saccade time through to the end of the average word duration plus saccade time) and from 700ms onwards (the mean duration of target words plus a 200ms saccade, where listeners should have visually preferred a brand logo semantically related to the target word).

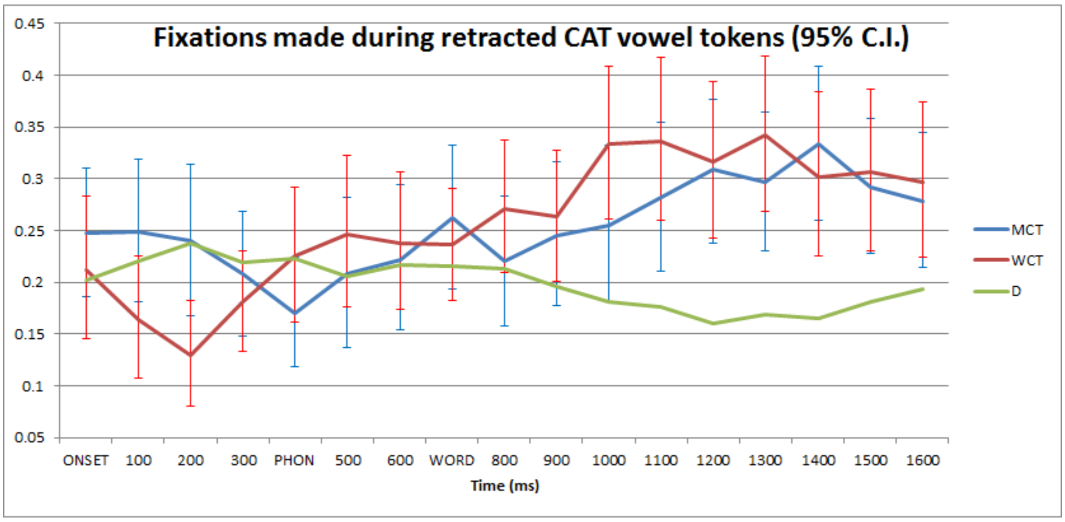


Figure 7.4: Fixations made towards target images while hearing retracted CAT vowel tokens (Experiment 3). Fixations towards working-class target brands shown in red, middle-class target brands shown in blue, distractor brands shown in green.

Figure 7.4 shows participant fixations towards both working and middle-class brand logos and distractor logos while hearing 'retracted' CAT vowel tokens — that is, tokens with a measured F2 of between 1,300Hz and 1,400Hz. On the x-axis, PHON marks the onset of stressed /a/ plus 200ms for a saccade to take place (the first point where an effect of /a/ realisation could appear in the fixation data), and WORD marks the average word duration plus 200ms for a saccade to take place (where we can reasonably expect to see semantic information affect listener fixations). 95% confidence intervals are centered around fixations towards working-class and middle-class brands. Retracted CAT realisations were produced 10 times by middle-class speakers and 20 times by working-class speakers in the auditory stimuli.

The graph shows no significant differences in looks towards working-class brands versus middle-class brands. Listeners can be seen to react to the semantic information in the target words from around 1,000ms after the onset of auditory stimuli onwards, visually preferring both working and middle-class target brands over semantically unrelated distractor images (shown in green). From this, we can surmise that retracted CAT vowel realisations had little effect on the socio-economic associations made by listeners.

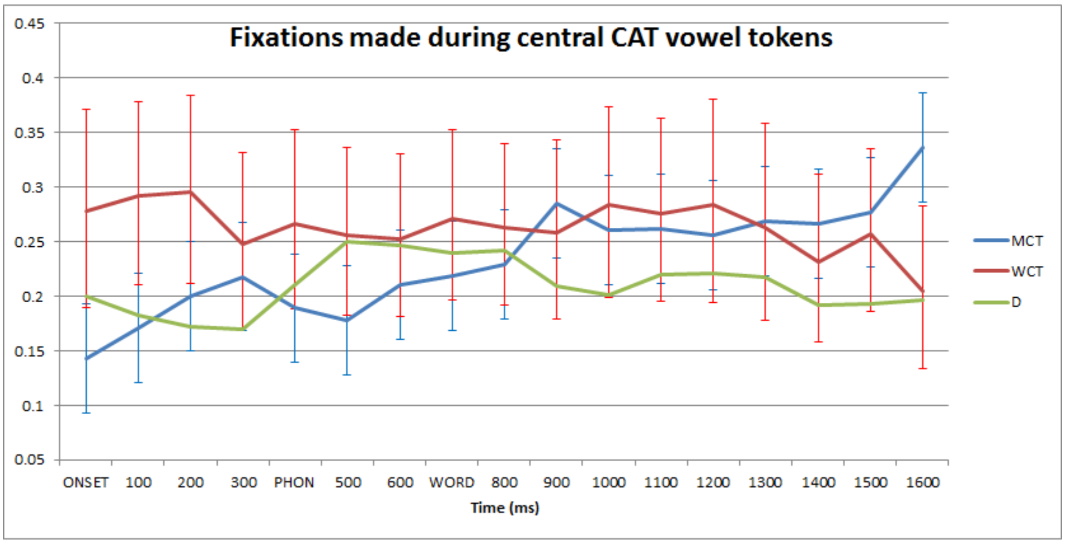


Figure 7.5: Fixations made towards target images while hearing neutral CAT vowel tokens (Experiment 3). Fixations towards working-class target brands shown in red, middle-class target brands shown in blue, distractor brands shown in green.

Figure 7.5 shows participant fixations towards both working and middle-class brand logos and distractor logos while hearing 'central' CAT vowel tokens — that is, tokens with a measured F2 of between 1300Hz and 1400Hz. This range was specifically chosen as it centered around the mean CAT vowel F2 value of all speakers of 1,356Hz, above the 1,290Hz median F2 of all working-class speaker productions and below the 1,412Hz median F2 of all middle-class speakers. While an arbitrary designation, the 'central' label applies to the F2 values across the sample of stimuli speakers. Error bars showing 95% confidence intervals are displayed on fixations towards the working-class and middle-class targets. The words ONSET, PHON, and WORD are positioned on the x-axis to indicate the onset of the target words, the earliest time bin where participant reactions to stressed /a/ would be visible, and the earliest time bin where participants semantic associations would be visible, respectively. Perhaps unsurprisingly, these tokens did not appear to elicit significant visual preferences for working or middle-class target brands. Participant fixations towards working-class brands appear to have remained relatively stable throughout these tokens, while fixations towards middle-class brands steadily increased until becoming significantly ($p<.05$) more likely than fixations towards working-class brands at 1,600ms after the target word onset, although this is a late effect.

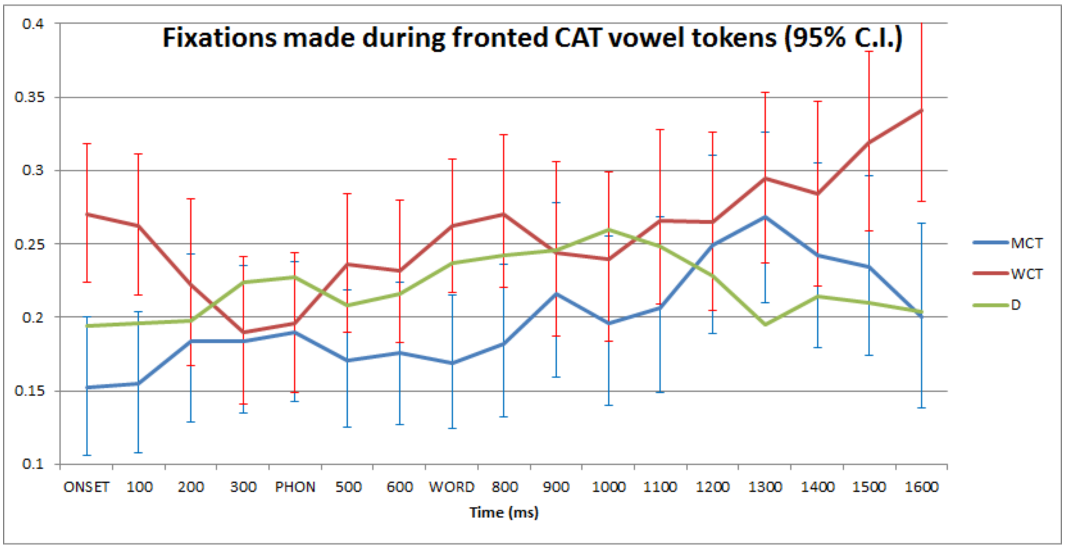


Figure 7.6: Fixations made toward target images while hearing fronted CAT vowel tokens (Experiment 3). Fixations towards working-class target brands shown in red, middle-class target brands shown in blue, distractor brands shown in green.

Figure 7.6 shows participant fixations made during fronted CAT tokens, with error bars generated on 95% confidence intervals for the mean difference around fixations towards middle-class brands (fronted realisations being more commonplace among the middle-class speakers in the auditory stimuli). Here we can see significant divergence ($p<.05$) between fixations towards working-class brands and middle-class brands from the onset of auditory stimuli, continuing across the following 100ms time bin. This divergence then disappears until the mean onset of CAT realisations, 400ms after the onset of auditory stimuli. A significant divergence in listener fixation behaviour re-emerges at 300ms following mean onset of CAT realisations. Listeners were also found to have fixated upon working-class brands in significantly ($p<.05$) greater proportions at 1,600ms following the onset of auditory stimuli (1,200ms following the mean onset of CAT), although this is a late effect.

7.3.2 Post-Vocalic/Post-Consonantal /l/ Realisations

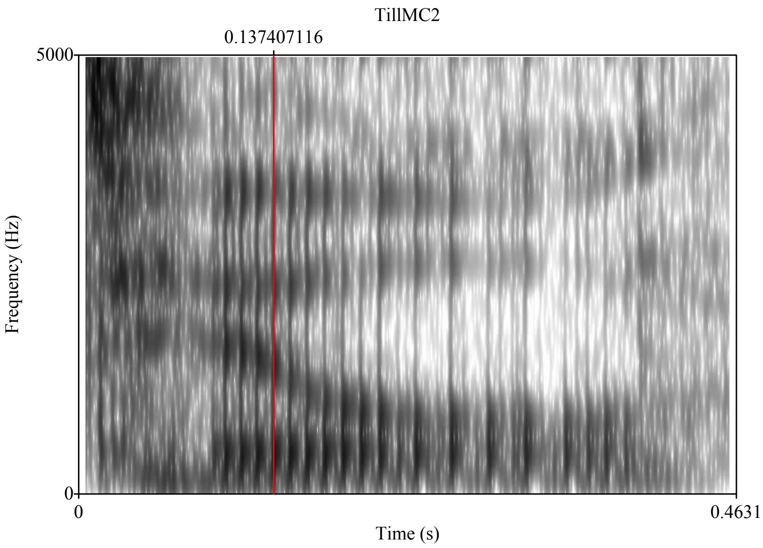


Figure 7.7: Post-vocalic /l/ onset in *till*, speaker MC2 (Experiment 3)

The durations of words containing post-vocalic/post-consonantal /l/ realisations and onset times of /l/ realisations were measured in *Praat*, using F2 and F3 transitions as a visual guide to /l/ realisation onset (as in figure 7.7) and auditory analysis when no transitions were evident. For vocalised /l/ tokens, /l/ realisation onset was measured at the beginning of the vowel. This gave an average target word duration of 376ms, and an average /l/ realisation onset time of 217ms, giving slightly different critical time periods to examine than for CAT vowel realisations. Rounding up/down and adding 200ms for a saccade to take place in each instance, gives time bins of 400ms onwards for an effect of /l/ realisations, and 600ms onwards for where we can expect semantic information to show an effect on fixation behaviour.

Figure 7.8 shows listener fixations made while hearing tokens containing strongly-vocalised /l/ realisations, a typically working-class Glaswegian dialect feature, with error bars based on 95% confidence intervals centered on fixations towards working-class target brands. No significant ($p>.05$) differences emerged between fixations towards working-class brands and fixations towards middle-class brands. Listeners were found to have visually preferred

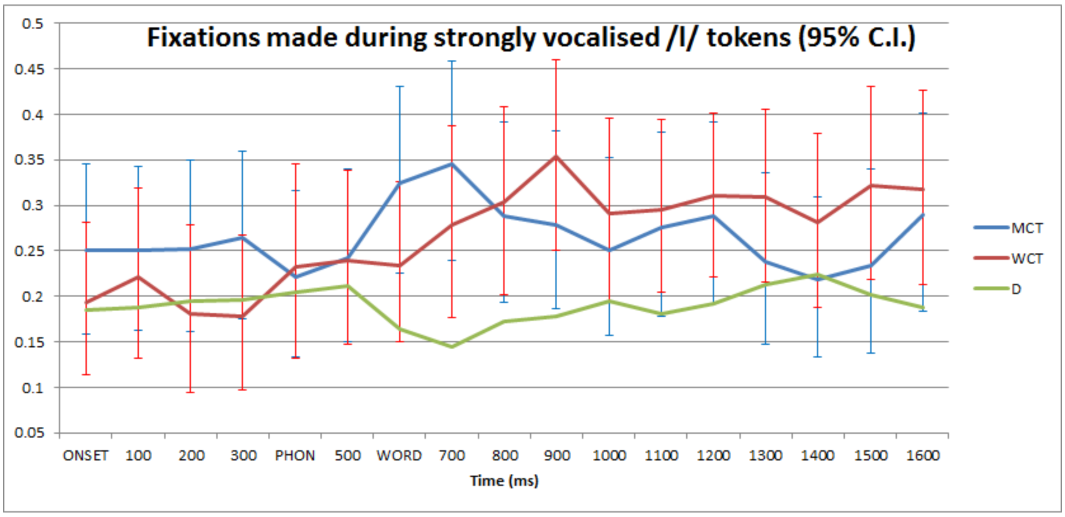


Figure 7.8: Fixations made towards target images while hearing strongly-vocalised /l/ tokens (Experiment 3). Fixations towards working-class target brands shown in red, middle-class target brands shown in blue, distractor brands shown in green.

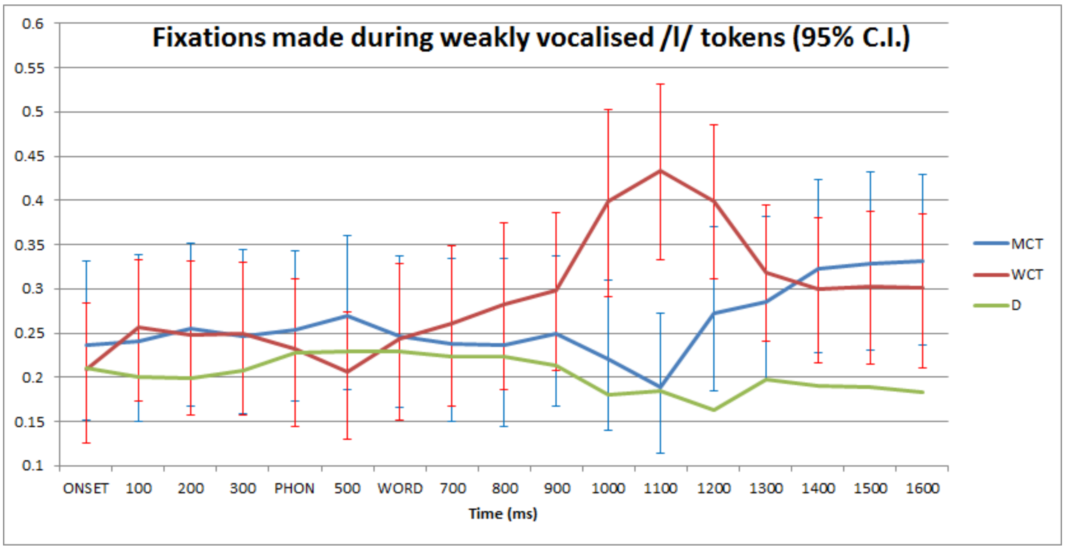


Figure 7.9: Fixations made towards target images while hearing weakly-vocalised /l/ tokens (Experiment 3). Fixations towards working-class target brands shown in red, middle-class target brands shown in blue, distractor brands shown in green.

both targets over the semantically-unrelated distractor images.

Figure 7.9 shows listener fixations made while hearing tokens containing weakly-vocalised /l/ realisations, a typically working-class Glaswegian dialect feature, with error bars based on 95% confidence intervals centered on fixations towards working and middle-class target brands. A significant ($p<.05$) visual preference for working-class brands over middle-class brands can be seen at 1,100ms following the target word onset (700ms following the mean onset of /l/ realisaitons). While it is not known for certain why weakly-vocalised /l/ realisations produced a marked effect whereas strongly-vocalised /l/ realisations did not, the answer may lie in the social class of the speakers which listeners heard producing the variants. Table 7.4 shows strongly-vocalised /l/ to have been produced 4 times by self-reported middle-class speakers, as opposed to 14 times by self-reported working-class speakers. Conversely, weakly-vocalised /l/ was found to have been produced 12 times by self-reported middle-class speakers, and only 7 times by working-class speakers. The disparity in fixations made between the two variants may suggest a greater effect of /l/ vocalisation when the realisation is produced by a class-incongruent (middle-class) speaker than by a class-congruent (working-class) speaker. Furthermore, the late effect seen in listener responses to weakly-vocalised /l/ may be indicative of additional cognitive processing in resolving class-incongruence between social information derived from the speaker (bearing in mind that listeners heard each speaker multiple times throughout the experiment) and from socially-marked phonetic variation.

Figure 7.10 shows listener fixations made while hearing tokens containing dark /l/ realisations, with error bars based on 95% confidence intervals centered around fixations towards middle-class target brands. As the most commonplace /l/ realisation in both working-class and middle-class Glaswegian speech, it is perhaps unsurprising that little variation in listener fixations towards working-class brands and middle-class brands is evident. It was noticed during the auditory coding of dark /l/ tokens, however, that such realisations exist in a perceptually diverse range, making a case for further sub-categorisation of this variable in future research.

Figure 7.11 shows listener fixations made while hearing tokens contain-

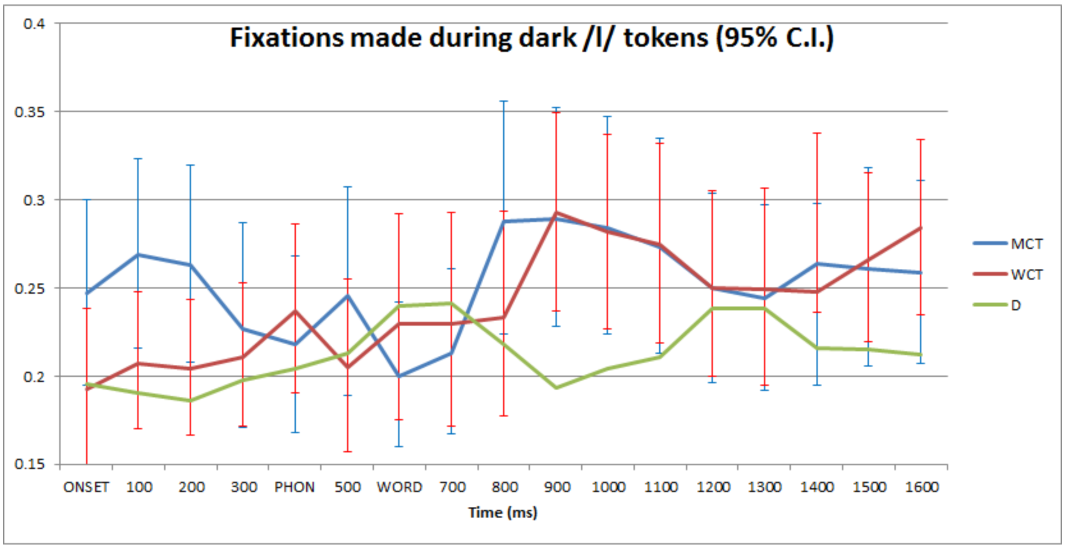


Figure 7.10: Fixations made towards target images while hearing dark /l/ tokens (Experiment 3). Fixations towards distractor images shown in green.

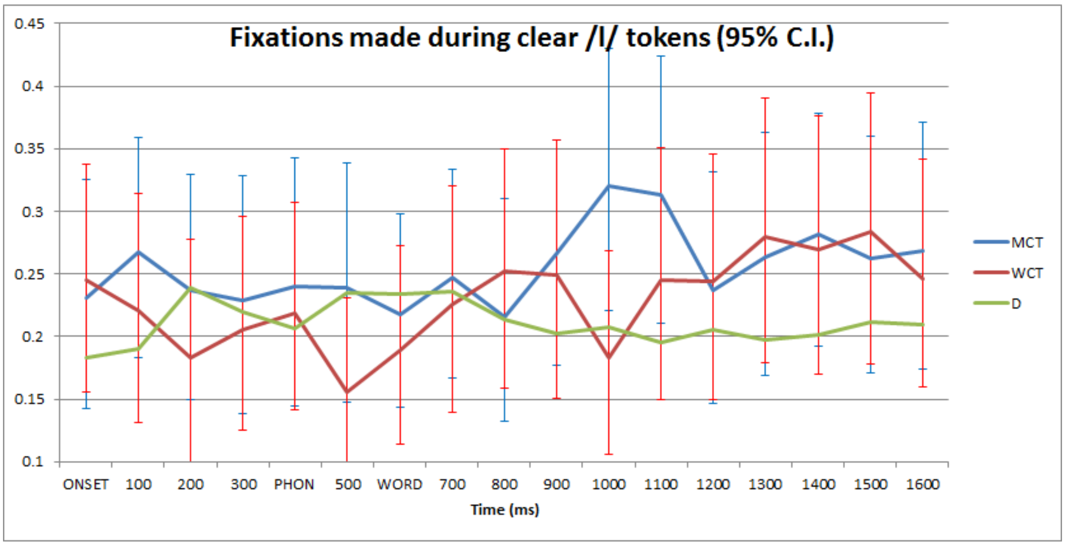


Figure 7.11: Fixations made towards target images while hearing clear /l/ tokens (Experiment 3). Fixations towards working-class target brands shown in red, middle-class target brands shown in blue, distractor brands shown in green.

ing clear /l/ realisations, a typical middle-class Glaswegian dialect feature, with error bars based on 95% confidence intervals centered on fixations towards middle-class target brands. While no significant divergence in listener fixation behaviour was observed, listeners showed a marginally significant preference for middle-class brands at 400ms following the mean onset of /l/ realisations, a class-congruent pattern for this variable.

7.3.3 Non-Prevocalic /r/ Realisations

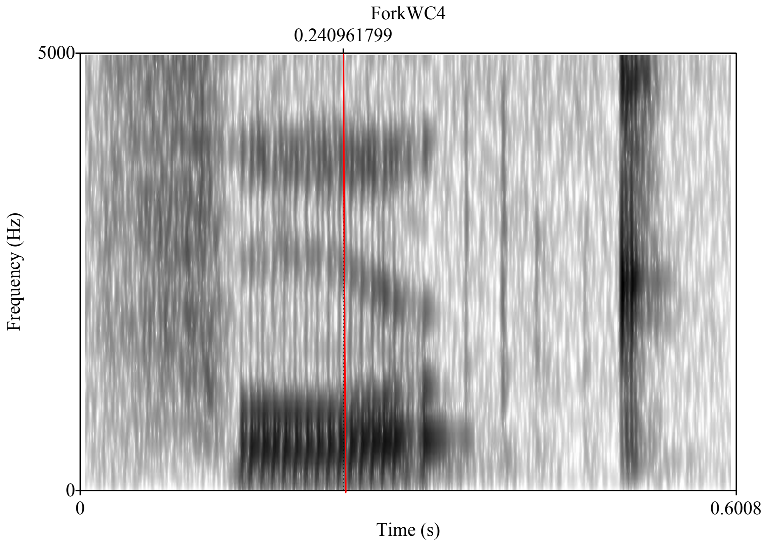


Figure 7.12: Non-prevocalic /r/ onset in *fork*, speaker WC4 (Experiment 3)

Measurement of the durations of target words containing non-prevocalic /r/ realisations and the onset times of /r/ realisations were recorded for each stimuli token in *Praat*, using F2 and F3 formant transitions as a visual guide to /r/ onset (as in figure 7.12) and auditory analysis where no formant transitions were evident. For completely derhotic tokens, /r/ onset was either recorded as occurring upon an audible change in vowel quality, or as the start point of the vowel in cases where no change in vowel quality was audible. From this, the mean target word duration of 417ms and mean /r/ realisation onset of 226ms were calculated, giving critical time periods of 400ms onwards for an effect of non-prevocalic /r/ realisation to become visible and 600ms onwards for a visible effect of semantic information from the target words heard.

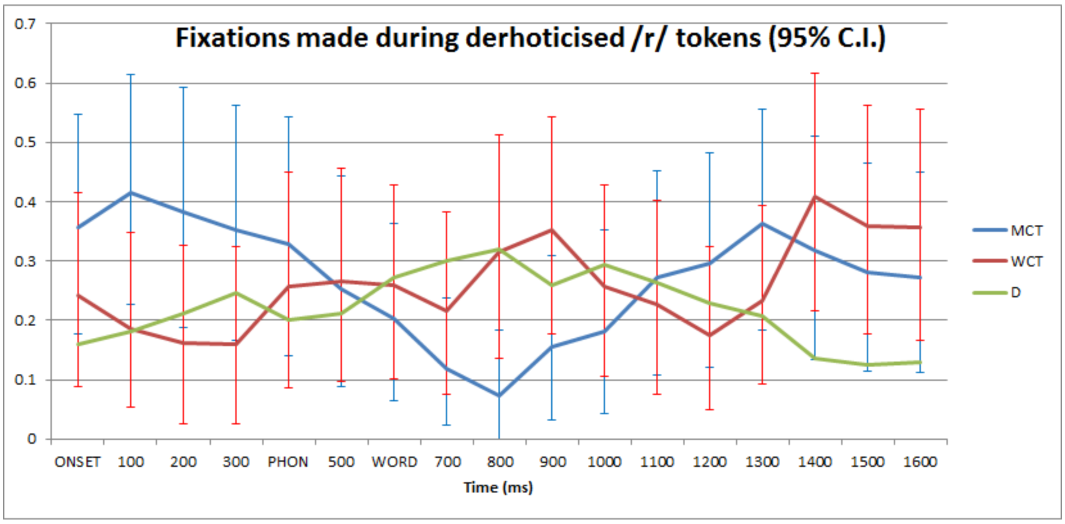


Figure 7.13: Fixations made while hearing derhoticised /r/ tokens (Experiment 3). Fixations towards working-class target brands shown in red, middle-class target brands shown in blue, distractor brands shown in green.

Figure 7.13 shows listener fixations during derhoticised /r/ tokens (complete derhoticity), a typically working-class Glaswegian feature, with error bars based on 95% confidence intervals centered on fixations towards working and middle-class target brands. Listeners were found to have visually preferred middle-class brands over working-class and distractor brands from the onset of auditory stimuli until the mean onset of /r/ realisations. Following the mean /r/ onset, the proportion of fixations towards middle-class brands is shown to visibly decrease until a listener preference towards working-class and distractor brands over middle-class brands emerges at 200ms following the mean /r/ onset. This effect is particularly pronounced at 400ms following the mean onset of /r/ realisations, but differences in fixations towards middle-class versus working-class brands do not exceed marginal significance.

Figure 7.14 (p.154) shows listener fixation behaviour while hearing tokens containing weak rhoticity (realisations such as pharyngealised /r/ and rhoticised vowels), a typically working-class Glaswegian dialect feature, with error bars based on 95% confidence intervals centered around fixations to-

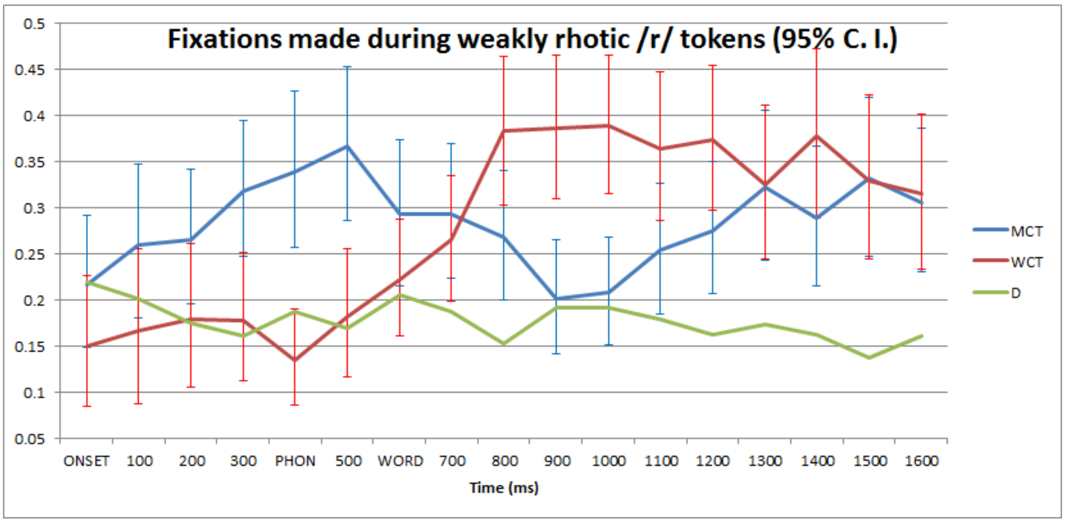


Figure 7.14: Fixations made while hearing weak /r/ tokens (Experiment 3). Fixations towards working-class target brands shown in red, middle-class target brands shown in blue, distractor brands shown in green.

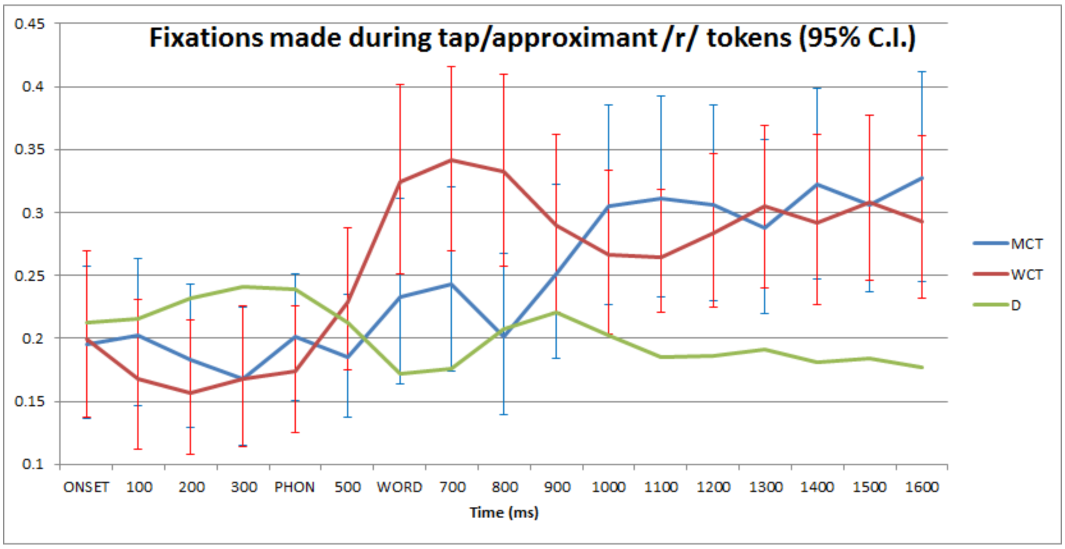


Figure 7.15: Fixations made while hearing tap/approximant /r/ tokens (Experiment 3). Fixations towards working-class target brands shown in red, middle-class target brands shown in blue, distractor brands shown in green.

wards working and middle-class target brands. Weakly rhotic tokens were heard to have been produced 11 times by middle-class speakers and 15 times by working-class speakers. Listeners were significantly ($p<.05$) more likely to fixate upon middle-class target brands than any other images from the mean onset of /r/ realisations and for 100ms following, although this trend was observed as beginning shortly after the onset of auditory stimuli, reaching marginal significance 100ms before the mean /r/ onset, suggesting that this effect was unlikely to have been triggered by the variant. Listeners can then be seen producing proportionately more fixations towards working-class brands, with listeners significantly more likely to fixate upon working-class brands than middle-class brands from 500-600ms following the mean onset of /r/ realisations.

Figure 7.15 (overleaf) shows listener fixations during tokens containing approximant and tap /r/ realisations, with error bars based on 95% confidence intervals centered on fixations towards middle-class target brands. These realisations were found to have been produced 14 times by the middle-class speakers in the auditory stimuli and 17 times by the working-class speakers, demonstrating that these realisations are fairly common among in both varieties of Glaswegian. These tokens appear to have elicited a visible trend of fixations towards working-class brands over middle-class brands from 200-400ms following the mean /r/ onset, with the effect particularly pronounced at the 400ms mark. This effects, however, was not statistically significant.

Figure 7.16 (above) shows listener fixations during tokens containing bunched /r/, a typically middle-class Glaswegian dialect feature, with error bars based on 95% confidence intervals centered on fixations towards working and middle-class target brands. Bunched /r/ realisations were produced 10 times by middle-class speakers and once by the synthetic voice. No working-class speakers produced bunched /r/ realisations. It is perhaps surprising, then, to see listeners significantly ($p<.05$) more likely to fixate upon working-class target brands than middle-class target brands across four consecutive time bins — from 300-600ms following the mean /r/ onset. Listeners can then be seen to have shifted their visual preference of brands towards

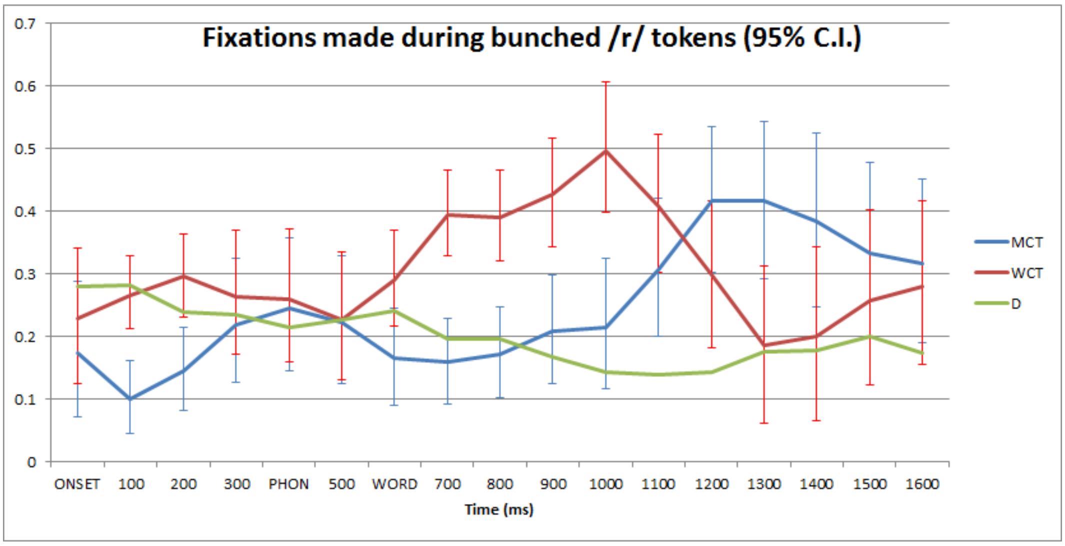


Figure 7.16: Fixations made while hearing bunched /r/ tokens (Experiment 3). Fixations towards working-class target brands shown in red, middle-class target brands shown in blue, distractor brands shown in green.

middle-class targets, with a marginally significant preference of middle-class brands over working-class brands visible at 900ms following the mean onset of /r/ realisations.

7.4 Discussion

Effects of socially-marked phonetic variation appear to be evident in listener fixation behaviour during certain realisations of all three variables under examination. Significant ($p<.05$) differences in listener fixations towards target brands were observed as having occurred during fronted CAT vowel realisations (300ms following mean /a/ onset), weakly vocalised /l/ (700ms following mean /l/ onset), weakly rhotic /r/ (500ms following mean /r/ onset), and bunched /r/ (300ms following mean /r/ onset), with differences in listener fixation behaviour towards target brands approaching significance elsewhere.

Listeners were found to have made proportionately more fixations towards working-class brands than middle-class brands following the more-fronted CAT vowel realisations, despite the majority of these variants having been produced by self-reported middle-class speakers (29 fronted realisations, versus 12 produced by self-reported working-class speakers). Fronted CAT realisations, however, are commonly said to be a feature of working-class Glaswegian speech, with Lawson (2011: 244), for example, finding high school children belonging to the socially-stigmatised and typically underclass 'Ned' social group to have produced more fronted and lowered CAT realisations than children belonging to other social groups. This appears to indicate that it was the realisation of CAT, rather than socially-encoded suprasegmental information, which drove listener fixations towards working-class brands in this instance.

Where significant ($p<.05$) differences in listener fixation behaviour emerged elsewhere, these also patterned in class-congruent directions, with weakly-vocalised /l/ and weakly-rhotic /r/ realisations (primarily found in working-class speech) eliciting significantly higher proportions of fixations towards working-class target brands. It is not immediately obvious, however, why listener fixations towards target brands showed a diverging effect during these variants and not during tokens containing complete derhoticity or perceptually stronger /l/ vocalisation. One possible explanation is that this resulted from listener hypercorrection, as is thought to have been the case with the explicit choices of objects which listeners reported in Experiment 2 (p.117), with listeners reluctant to associate brands carrying connotations of lower socio-economic status with more stigmatized phonetic realisations. Given the short time window for listener responses, however, this would seem improbable here. While no appreciable differences in listener fixation behaviour were evident upon hearing the more strongly vocalised /l/ variant, this may reflect the manner in which these tokens were perceptually coded, and future acoustic analysis is planned to investigate this. The lack of significant differences in listener fixations towards target brands during derhotic /r/ tokens may also be explained by the small number of derhotic /r/ productions heard during the experiment, with completely derhotic /r/ accounting for only 5 of the 81 /r/ realisations heard throughout the experiment. Despite the low number of realisations, the time-course of listener fixations towards middle-class brands upon hearing this variant suggests that this variant elicited an effect, albeit a non-significant one.

Bunched /r/ realisations, a stereotypically middle-class feature (MacFarlane & Stuart-Smith 2012), appear to have produced a class-incongruent effect — with listeners fixating upon working-class brands in significantly ($p<.05$) greater proportions from 300-600ms following the mean /r/ onset. The subsequent trends in fixation behaviour following these tokens, however, with fixations towards working-class brands decreasing and fixations towards middle-class brands increasing, suggests that listeners took longer to derive class-congruent social information for this variant.

While the earliest significant divergences in listener fixation behaviour appear to have occurred some 300ms following the onset of two separate variables (fronted CAT and bunched /r/), on the cusp of previously established thresholds of implicit cognition in social psychology (cf. Greenwald *et al* 1998), this is somewhat misleading due to the formatting of the fixation data, with time bins representing averaged fixations for the previous 100ms. It seems likely, then, that notable divergences in fixations towards targets would have occurred at some point in the 200-300ms following the onset of the phonetic realisations in question, and a more fine-grained analysis is planned to investigate this.

Despite this, the differences in listener response times upon hearing different socially-marked phonetic realisations suggests that the associations triggered by some variants are less conscious than the associations triggered by others — indicating that some socially-marked phonetic variants carry a greater cognitive processing cost than others.

Chapter 8

Experiment 4 - Subjective Reaction Test

8.1 Introduction

In order to examine the participants' explicit attitudes, enabling comparisons with the implicit associations indicated in the eye tracking data, a subjective reaction test (N=60) was administered immediately following the eye tracking experiment, collecting explicit attitudinal responses towards each speaker heard in the Visual World task. Here, it was hypothesized that the explicit attitudes recorded from participants would diverge from the implicit associations indicated by their fixations during the eye tracking task – as is generally found in social psychology experiments which have utilised only visual stimuli (cf. Greenwald *et al* 1998; Karpinski & Hilton 2001). A result in line with this hypothesis would be in keeping with the findings of previous social psychology experiments that used only visual stimuli, indicating that people undergo similar conscious and unconscious processes when deriving social information from speech as when visually-deriving social information.

It was decided to give participants the subjective reaction test immediately following the eye tracking task in Experiment 3 (in order to better hide the purpose of the eye tracking task), as the test included a form which contained sections for participants to indicate their social class, and it was felt that the purpose of the experiment (explicitly rating different speaker personality traits) was more obvious than that of the eye tracking task. Testing participants in the same day was also convenient from a practicality standpoint — as having to call participants back for further tests at a later date would have made attaining a sufficient number of participants considerably more difficult.

Taking Kristiansen (2009) into account, who found that Danish speakers from Copenhagen thought to have more ‘conservative’ accents were rated highest by listeners in terms of superiority values, whereas those with more ‘modern’ Copenhagen accents were rated highest by listeners in terms of dynamism values, it was hypothesized that a similar distinction would be found in listener ratings of working-class and middle-class Glaswegian speakers. While the linguistic context in Copenhagen differs from that in Glasgow in many respects, with the former largely divided between ‘conservative’ and ‘modern’ socially accented speakers and the latter primarily divided between working-class and middle-class speakers, it is thought that there may be parallels to be found between them – with Danish listener evaluations of ‘conservative’ Copenhagen accents likely to correlate with Glaswegian listener ratings of middle-class Glaswegian speakers. Similarly, given the negative evaluations repeatedly found of working-class Glaswegian speech (Macauley 1977; Menzies 1991; Macafee 1994; Torrance 2003), it might be expected that Glaswegian listener ratings of Glaswegian speech would resemble the negative evaluations made by listeners from Copenhagen towards non-Copenhagen regional Danish accents (termed ‘local’ accents by Kristiansen 2009: 187). Previous studies, however, have found working-class Glaswegian speech to have been positively evaluated in terms of ‘solidarity’ values (Macafee 1983) and ‘social attractiveness traits’ (Torrance 2003: 43), suggesting that Glaswegian listener evaluations of working-class Glaswegian speakers may be more in line with Copenhagen listener evaluations of ‘modern’ Copenhagen accents, which were rated highest in terms of Kristiansen’s (2001) dynamism values.

8.2 Method

8.2.1 Participants

60 native Glaswegian participants were recruited via the University of Glasgow Psychology Department's subject pool, as well as through emails circulated by departmental secretaries and posters placed in and around campus. These included the 54 participants who took part in the eye tracking experiment, as well as 6 others who took part in the eye tracking task but whose fixation data were excluded from analysis in order to balance the design of that experiment (p.127). Of the 60 participants, 33 (55%) were female, 28 (46.7%) self-identified as either working-class or upper working-class, and 32 (53.3%) self-identified as either lower middle-class or middle-class. Participant ages ranged from 18 to 61 years old (M=25.5, SD=9.6).

In addition to their age and self-reported social class, participants were also asked for their region of residence, region of birth, high school attended, parents' regions of birth, and parents' occupations. It was intended that this information would allow for a more objective measure of each participant's social class to be calculated. This, however, proved not to be possible, as the variety of home regions, high schools, and parents' birthplaces and occupations were too wide to allow meaningful comparisions to be made. 45 different high schools were reported, for example, with no more than 3 participants having attended any one school. With similar frequencies found in the other class-related fields, this method was abandoned in favour of using participants' self-reported social class.

8.2.2 Materials

The test comprised separate audio recordings of each speaker heard during the eye tracking experiment, with subjects tasked with rating each speaker in terms of different social attractiveness values presented in an accompanying questionnaire. The values chosen to be assessed were chosen from the status and attractiveness values outlined by Zahn & Hopper (1985), and categorized under the superiority and dynamism schema utilized by Kristiansen (2001). For example, the values 'intelligent' and 'ambitious' fall under Zahn & Hopper's (1985) status dimension, while the values 'pleasant' and 'trustworthy' were categorized under their attractiveness dimension, with all four being labeled as superiority values by Kristiansen (2001). Likewise, the values 'efficient' and 'independent' fall under Zahn & Hopper's (1985) status dimension, and the values 'interesting' and 'straightforward' fall under their attractiveness dimension, with all four being labeled as dynamism values by Kristiansen (2001). Figure 8.1 shows the semantic differential scales used in the experiment, with 7-point scales being chosen to provide listeners with a neutral option for each value, and also to enable easier comparisons with Kristiansen (2001: 15), who also utilized 7-point scales.

Auditory Stimuli

Auditory stimuli were drawn from the same eight Glaswegian speakers and one synthetic voice heard in the Visual World experiment, with the table reproduced here (table 8.1) for ease of reference. For each speaker, the words *can, mile, drinker, steer, tags,* and *double* were concatenated in *Audacity* and normalized to +10dB to ensure that amplitudes remained consistent across tokens and voices. These specific tokens were selected to give two instances where socially marked variation could occur in each variable under examination (the CAT vowel in *can* and *tags*, non-prevocalic /r/ in *drinker* and *steer*, and post-vocalic/post-consonantal /l/ realisations in *mile* and *double*). Furthermore, these tokens were not included in the eye tracking experiment, so participants had not encountered them prior to the subjective reaction test. In order to prepare the stimuli for analysis, instances of post-vocalic/post-consonantal /l/ and /r/ were coded auditorily according to 4 point scales. This entailed categorising post-vocalic/post-consonantal /l/ realisations as either clear /l/, dark /l/, weakly-vocalised /l/, or strongly-vocalised /l/. Similarly, post-vocalic /r/ productions were categorised as either bunched /r/, tap or approximant /r/, weakly rhotic (such as pharyngealised /r/ realisations), or completely derhotic, as in the accompanying eye tracking study. The most prominent voice qualities were also audito-

Speaker Codename	Age	Home Region	Social Class (self-reported)
WC1	24	Thornliebank	Working Class
WC2	28	Anderston	Working Class
WC3	21	Riddrie	Working Class
WC4	19	Pollock	Working Class
MC1	31	Bearsden	Middle Class
MC2	29	Barrhead	Middle Class
MC3	21	Cathcart	Middle Class
MC4	21	Helensburgh	Middle Class
S1	23	Edinburgh	Synthetic voice

Table 8.1: Speakers heard in auditory stimuli during Subjective Reaction Test (Experiment 4)

rily coded for each speaker, by perceptual analysis. Speaker voice qualities were auditorily analysed by an additional two trained phoneticians (Jane Stuart-Smith and Robert Lennon, of the Glasgow University Laboratory of Phonetics) in order to determine the most prominent voice qualities for each speaker. Other speaker qualities were determined via acoustic analyses in *Praat]* — namely, the fundamental frequency (F0) of each speaker's voice (calculated by dividing a period in the mid-point of their productions of *pack* by 1 second) and the F1 and F2 values of /a/ in *can*. Formant values were determined using *Praat's* 'track formants' function, taking readings from the temporal mid-point of the vowel after visually checking the formant track against the formant patterns in the spectrogram. From this, the total number of instances of 'working-class' prototypical productions of /l/, /r/, and /a/ were tallied for each speaker across the combined six-word utterances heard by participants during the subjective reaction test.

Equipment

Participants were sat in front of a desktop PC running *Goldwave*. Audio was relayed via a Dell *5650* 5.1 surround sound system. Only two (left and right) speakers were utilized during the experiment, placed either side of the display screen, with volume kept at a constant 25% of the maximum system volume in order to ensure that participants were subjected to consistent amplitudes throughout. Responses were collected via pen-and-paper questionnaires containing semantic differential scales (Figure 8.1).

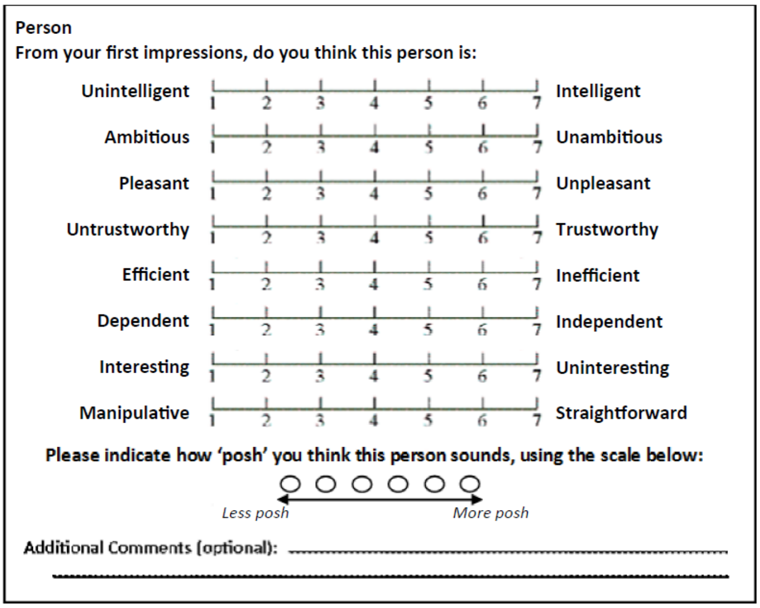
Analysis

A principle component analysis was conducted on participant ratings of speaker personality traits in *SPSS* using the Anderson-Rubin (1958) method. The analysis revealed participant ratings to be reductible to three factors which accounted for most (62.3%) of the variance in the observed variables. Considering a factor loading of >.6 to be strong, table 8.2 (p.165) shows participants to have given the 'ambitious', 'efficient', and 'interesting' personality traits similar ratings (Component 1), the 'intelligent', 'independent', and 'poshness' traits similar ratings (Component 2), and the 'pleasant', 'trustworthy', and 'straightforward' traits similar ratings (Component 3), accounting for all nine variables in the subjective reaction test. Taking Zahn & Hopper's (1985) status and attractiveness dimensions into account, it might be expected that participants would give working-class speakers higher Component 3 ratings (as the factor consists entirely of attractiveness traits) and middle-class speakers higher Component 2 ratings (as the factor consists entirely of status traits with the addition of 'poshness' — a trait overtly related to status). Under these dimensions, participants might also be expected to have given higher Component 1 ratings to middle-class speakers, as the factor consists of two status traits ('ambitious' and 'efficient') and one attractiveness trait ('interesting'). Under Kristiansen's (2001) superiority and dynamism dimensions, however, participants might be expected to have given higher Component 1 ratings to working-class speakers, as the factor contains two dynamism traits ('efficient' and 'interesting') and one superiority trait ('ambitious'). Similarly, Kristiansen's (2001) dimensions suggest that participants might have rated Component 2 traits higher for middle-class speakers (two superiority traits and one dynamism trait, with 'poshness' assumed to be a superiority trait), and also given higher Component 3 ratings to middle-class speakers (two superiority traits and one dynamism traits).

In order to control for any possible tendencies of listeners for rating speakers towards a specific end of the scale throughout the experiment, the position

	Component		
	1	2	3
Intelligent	.269	.795	.111
Ambitious	.750	.328	-.055
Pleasant	.519	-.083	.661
Trustworthy	.174	.255	.788
Efficient	.619	.351	.049
Independent	-.014	.646	.061
Interesting	.764	-.062	.138
Straightforward	-.146	-.059	.820
Poshnessfrom6	.152	.731	-.059

Table 8.2: Rotated component matrix identifying principal components of speaker personality trait ratings (Experiment 4)


Person

From your first impressions, do you think this person is:

Unintelligent	1 2 3 4 5 6 7	Intelligent
Ambitious	1 2 3 4 5 6 7	Unambitious
Pleasant	1 2 3 4 5 6 7	Unpleasant
Untrustworthy	1 2 3 4 5 6 7	Trustworthy
Efficient	1 2 3 4 5 6 7	Inefficient
Dependent	1 2 3 4 5 6 7	Independent
Interesting	1 2 3 4 5 6 7	Uninteresting
Manipulative	1 2 3 4 5 6 7	Straightforward

Please indicate how 'posh' you think this person sounds, using the scale below:

Less posh ... More posh

Additional Comments (optional): ....

Figure 8.1: Semantic differentials for perceived speaker personality traits in Subjective Reaction Test (Experiment 4)

Trait	Kristiansen (2001)	Zahn & Hopper (1985)
Intelligent	Superiority	Status
Ambitious	Superiority	Status
Pleasant	Superiority	Attractiveness
Trustworthy	Superiority	Attractiveness
Efficient	Dynamism	Status
Independent	Dynamism	Status
Interesting	Dynamism	Attractiveness
Straightforward	Dynamism	Attractiveness

Figure 8.2: Social attractiveness traits in Zahn & Hopper (1985) and Kristiansen (2001)

of the positive and negative values on each scale were switched on alternating traits. In addition, antonyms were placed at opposing ends of each semantic differential scale for the values used by Zahn & Hopper (1985) and Kristiansen (2001), and participants were also asked to indicate 'how posh' they felt each participant was on a scale of one to six. This was carried out in order to draw a direct comparison with the 'poshness' ratings in the brand norming task but, in hindsight, may have been better implemented as a seven-point semantic differential appearing alongside the other personality traits.

8.2.3 Procedure

Participants were sat in front of a pair of speakers (the front speakers of a Dolby *5650* surround sound system), a computer keyboard, and a questionnaire containing semantic differential scales representing different personality traits (Appendix 7, p.262). Subjects were then instructed to indicate their initial impression of each speaker's personality traits and how 'posh' they felt each speaker was on the scales (using a pen), and advised that they could offer additional comments for each speaker.

The experimenter cued sound files for each stimuli speaker in *Goldwave*, with participants informed that they could listen to each speaker as many times as they wanted by pressing the space bar on the keyboard positioned in front of them. When participants had finished rating a speaker, the ex-

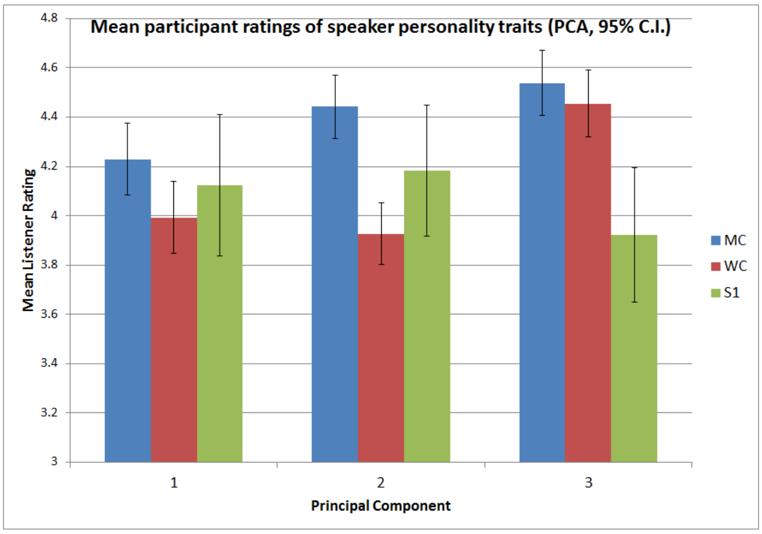


Figure 8.3: Mean participant ratings of speaker personality trait components, by social class (95% C.I.) (Experiment 4)

perimenter cued the next stimuli speaker. Stimuli were presented to each participant in one of three randomised orders in order to control for fatigue effects. No time limit was set for the experiment. After the task, subjects were de-briefed and payed £6 for their participation in this and the previous (Experiment 3) eye tracking task. The subjective reaction test was carried out immediately following Experiment 3 in order to better hide the purpose of the eye tracking task.

8.3 Results

8.3.1 Principal Component Analysis

Figure 8.3 shows averaged listener ratings of speakers across the three principal components by self-reported speaker class, with error bars generated from 95% confidence intervals. Here, participants were not found to have rated working-class speakers significantly ($p>.05$) differently from middle-class speakers or the synthetic speaker on Component 1 traits (ambitious, interesting, and efficient). Participants, however, rated middle-class speakers significantly ($p<.05$) more favourably in terms of Component 2 traits

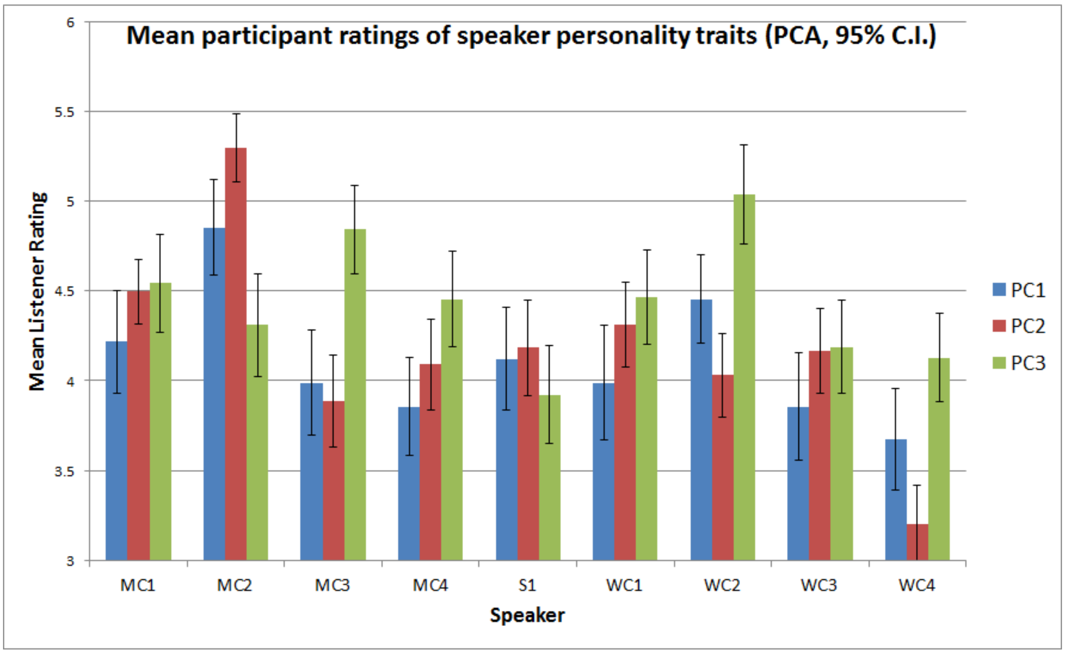


Figure 8.4: Mean participant ratings of speaker personality trait components, by speaker (95% C.I.) (Experiment 4)

(intelligent, independent, and 'more posh') than working-class speakers. Finally, participants were found to have rated both working and middle-class speakers significantly ($p<.05$) higher in terms of Component 3 traits (pleasant, trustworthy, and straightforward) than the synthetic speaker. This is despite the comparatively large confidence intervals generated for the synthetic speaker, due to there being only one synthetic speaker as opposed to four working-class and four middle-class speakers.

Figure 8.4 shows mean participant ratings of individual speakers, broken down by principal components and with 95% confidence intervals giving a visual indication of statistical signifance. Here we can see that the self-reported social class given by speakers is not a particularly reliable measure of listener perceptions.

Speaker code	Retracted CAT	Derhotic / weak /r/	Vocalised /l/	Fronted CAT	Approx / bunched /r/	Clear /l/
MC1	1	0	0	1	2	0
MC2	0	0	0	2	2	1
MC3	0	2	2	1	0	0
MC4	0	2	1	2	0	0
S1	0	0	0	2	2	0
WC1	0	2	1	1	0	0
WC2	2	2	2	0	0	0
WC3	0	2	1	1	0	0
WC4	0	2	2	2	0	0

Table 8.3: Class-typical realisations produced by each speaker in Subjective Reaction Test stimuli (Experiment 4)

8.3.2 Phonetic Variables

Tables 8.3 and 8.4 (p.169-170) show the number of typically working-class and typically middle-class socially-marked phonetic realisations produced by each speaker, using the same classification criteria as was used for the eye tracking analysis. Here, 'working-class' realisations consist of retracted CAT realisations (with F2 values of less than 1,300Hz), derhotic and weakly rhotic non-prevocalic /r/ realisations, and vocalised (whether weakly or strongly) post-consonantal/post-vocalic /l/ realisations. Conversely, 'middle-class' realisations consist of fronted CAT vowel tokens (with F2 values of greater than 1,400Hz), tap, approximant, or bunched non-prevocalic /r/ realisations, and clear post-vocalic/post-consonantal /l/ realisations. 'Central' CAT vowel productions (with F2 values between 1,300Hz and 1,400Hz) and dark /l/ realisations were excluded from analysis, as these are frequent in both speech varieties.

Notable comparisons can be made between figure 8.4 (p.168) and table 8.4 (p.170), with the former showing the speaker (MC2) that produced most typically middle-class realisations to have been rated signifcantly ($p<.05$) higher in terms of both Component 1 traits (corresponding primarily to status/dynamism values) and Component 2 traits (corresponding to status/superiority values) than any other speaker. Likewise, the speaker with

Speaker code	Total WC realisations	Total MC realisations
MC1	1	3
MC2	0	5
MC3	4	1
MC4	3	2
S1	0	4
WC1	3	1
WC2	6	0
WC3	3	1
WC4	4	2

Table 8.4: Aggregated class-typical realisations produced by each speaker in Subjective Reaction Test stimuli (Experiment 4)

the greatest frequency of 'working-class' realisations (WC2) is shown to have been rated significantly ($<.05$) higher in terms of Component 3 traits (corresponding to Zahn & Hopper's attractiveness dimension) than every other speaker with the exception of speaker MC3. It is also notable that speaker MC3, the second most highly rated speaker in terms of Component 3 traits, self-reported as middle-class but was found to have produced two vocalised /l/ tokens and two derhotic/weakly rhotic /r/ tokens in the auditory stimuli. This suggests that self-reports of speaker class are not a reliable metric for sociolinguistic analyses. It also indicates, however, that listeners associated working-class typical phonetic realisations with Component 3 'attractiveness' traits, and middle-class typical realisations with Component 2 'status/superiority' traits. Also of note are listener principal component ratings towards speaker WC4, who participants rated significantly ($p<.05$) less favourably than any other speaker in terms of Component 2 (status/superiority) traits, and less than any other speaker (with the exception of the synthetic voice) in terms of Component 1 and Component 3 traits. Along with speaker MC3 and speaker WC2, speaker WC4 was found to have produced two typically working-class non-prevocalic /r/ realisations and two typically working-class post-consonantal/post-vocalic /l/ realisations, suggesting that the phonetic realisations of these variables do not account for the differences in listener ratings of this speaker. Furthermore, speaker WC2 shares the voice qualities of slight creak and laxness with speaker WC4 (table 8.5), suggesting that some other factor caused listeners to rate WC4 less favourably than any other speaker.

Speaker code	F0 (cAn)	Creak	Breathy	Lax	Tense
MC1	101	1	1	0	0
MC2	86	2	0	0	0
MC3	94	0	2	0	0
MC4	129	0	0	0	2
S1	104	0	0	0	1
WC1	94	1	1	2	0
WC2	104	0	1	0	0
WC3	92	2	1	0	0
WC4	89	1	0	2	0

Table 8.5: Speaker voice qualities heard during Subjective Reaction Test (Experiment 4)

Table 8.5 shows speaker voice qualities and F0 frequencies, the latter of which was measured from single periods at the stable mid-point of speaker realisations of /a/ in *can*. While the table provides too few data points for statistical analysis, little correlation with listener principal component ratings is evident with regards to either voice qualities or the fundamental frequencies of speakers' voices. While there is no statistical analysis available, the optional comments participants made regarding each speaker may go some way to explaining their ratings here:

Speaker MC1 Comments:

Middle class, student-like, nervous and uptight.
Quite commanding voice.
Quickly spoken, makes him sounds very untrustworthy.
Prefer voice 1 (WC4) but this is v. Scottish too. Business like.
The way he says 'drinker' lessens how much it grates on me. Definitely not as much as voice 2 (MC2).
Clear speech and sounds confident.

Speaker MC2 Comments:

Very rich voice, sounds professional, voice suggests warm personality.
Sounds well educated but still approachable.
Sounds quite posh, upper class, good articulation.
Tough voice to read.
Sets my teeth on edge. Gut instinct is I don't like him, but he could turn out to be decent.
Voice feels almost like some sarcasm in it, so pleasantness is down.
Sounds more intelligent (than WC4) due to clarity of speaking.

Speaker MC3 Comments:

Curious?
Student.
Fairly posh, slowness of voice suggests laid-back personality.
Dull.
Sounded odd.
Sounded similar to my father.
More soothing style of imparting information.
Pleasant but quite unintelligent.
Very simple, sounds very normal.
Gentle. Makes me smile but in a 'aw bless' way. Pronunciation of 'drinker' makes a huge impact.
Voice sounds demotivated, but a pleasant person.
Sounds a bit friendly but not that interested.

Speaker MC4 Comments:

Good diction, less approachable perhaps or just younger.
Neutral reaction, sounds slightly nasal or odd? Not necessarily posh. Sounds SAD. If he spoke I would listen.
Person sounds not confident, not assertive.
Seems unsure.

Sounded electronically produced.
Sounds foreign.
Sounds halfway between extreme traits from working-class and middle-class accents.
Sounds like a methodical person.
Sounds shy and scared.

Speaker WC1 Comments:
Apathetic.
Pronunciation of 'drinker' makes me smile. Could be friends with this guy. Wouldn't be as annoying as voice 2 (MC2).
Sounds bored but is clear in speech.
Sounds like a doctor in training, short, to the point, good enunciation.
Sounds very normal.
Speaks slowly.
Younger speaker, good articulation.

Speaker WC2 Comments:
Best so far (previous voices were MC3, WC4, and MC4).
inflection on 'drinker', otherwise non-commital.
Makes me smile. Definitely Scottish but softer. The way he says 'drinker' makes me trust him.
More scottish (than WC4 and MC2).
Sounds a bit timid but speaks clearly and does not sound bored.
Sounds focussed.
Sounds middle-class and educated.
Sounds quite innocent.
Sounds straightforward and to-the-point but somebody not to be messed with.
Sounds very straightforward and independent in speech.
Working class but not uneducated, upbeat and enthusiastic.

Speaker WC3 Comments:
Bland, boring voice.
For some reason I dislike this voice.
Middle class GU student.
Person sounds a bit dull.
Sounded altered.
Sounds bored and uninterested. Also sounds quite forced.
Sounds David Tennanty (Dr Who 10). Scottish but softer accent. The association may have affected my impressions :)
Sounds older and educated.
Sounds quite interested.
Steady, monotone, almost little inflection at all, each word was just a word with no real commitment/context.
Sure of himself.
Tired sounding.

Speaker WC4 Comments:
Boring.
Difficult to judge some of the variables, 8 (Straightforward) in particular, from voice.
Dull.
Mechanic.
More neddy Glasgow accent (than WC3 and WC2).
Not the neddiest accent, sounds like Glasgow (home), makes me smile.
Rough voice.
Sounds a bit rough.
Sounds assertive, strong willed.
Sounds like a ned/hooligan.
Sounds rather brash.
Sounds unenthusiastic.

Speaker S1 (Synthetic Voice) Comments:
Boring, monotonous.
Computer.
Computer generated.
Difficult to judge due to slight distortion.
Monotone, getting nothing.
Odd audio recording, not sure if it has been manipulated? More difficult to gauge when selecting the areas/scales.
Quite hard to tell personality traits from this voice.
Seems to get clearer/more human towards the end. Hard to judge from voice as it seems like it may not be their own.
Sounds like a computer animated voice clip!
Sounds like it's being manipulated, almost robotic, therefore less human and not empathetic.
Sounds very posh.
Speaks quickly.
Very clipped and abrupt way of speaking.
Very difficult to make out what was said, it was a mumbled and not clear and confident.
Voice sounds computer generated.

Taking participant comments into account, then, it would seem that some quality of speaker WC4's voice was not taken into account which influenced listener ratings in the Subjective Reaction Test. These appear to correspond to the 'ned'/'neddy' underclass stereotype (including two separate mentions of sounding 'rough'), and the sole mention among participants of a working-class-associated blue-collar occupation ('mechanic'). Clearly, there is some tangible quality to the tokens produced by speaker WC4 which elicited such responses from listeners, and a future acoustic analysis is planned to account for this, and other, aspects of variation in the data.

8.4 Discussion

Preliminary analyses of the Subjective Reaction Test results (figure 8.3) revealed listeners to have rated middle-class speakers significantly ($p<.05$) higher than working-class speakers in terms of principal Component 2 traits (intelligent, independent, and 'more posh'), corresponding to Kristiansen's (2001) superiority dimension and Zahn & Hopper's (1985) status dimension. In this respect, both models were good predictors of listener attitudes towards middle-class speech in comparison to working-class speech. Other components, however, did not vary significantly by social class, making other aspects of each model untestable. Participant ratings of individual speakers (figure 8.4), however, show that self-reported social class is not necessarily a reliable predictor of participants' explicit associations of speakers. Despite this, the principal Component 2 ratings of the speaker who produced the highest ratio of typically middle-class realisations (MC2) offer an indication that greater concentrations of fronted CAT vowel, /bunched /r/, and clear /l/ elicit more favourable listener evaluations of personality traits corresponding to Zahn & Hopper's (1985) status dimension. Conversely, the principal Component 3 ratings of the speaker who produced the highest ratio of typically working-class realisations (WC2) indicate that greater concentrations of retracted CAT, weak/derhotic /r/, and vocalised /l/ elicit more favourable evaluations of personality traits corresponding to Zahn & Hopper's (1985) attractiveness dimension. This is in line with previous attitudinal research on working and middle-class Glaswegian speech varieties (Torrance 2003). If it is, indeed, higher frequencies of working and middle-class typical realisations of socially-marked phonetic variants which trigger differing explicit responses in listeners, then this would support Labov *et al*'s (2011) theory of the sociolinguistic monitor. The design of the subjective reaction test did not allow for a sufficient number of differing phonetic realisations to allow for any meaningful statistical analysis of this. The subjective reaction test did, however, provided evidence for listener evaluations of individual speakers, grouped together in terms of self-reported social class, and future by-speaker and by-social class analyses of Experiment 3 are planned in order to determine how these compare with the more implicit associations indicated by fixation behaviour.

Chapter 9

Discussion

This intent behind this research was to investigate the implicit social evaluations which listeners make upon hearing speakers of two different social accents in Glasgow. This was achieved via the use of a real-time eye tracking research methodology, recording the fixations which listeners made towards different sets of images (containing both working and middle-class associated targets) while hearing speakers of different social accents and socially-marked phonetic realisations. On the whole, the results show the different speech varieties and phonetic realisations to have elicited differing conscious and unconscious associations in listeners, as outlined below.

9.0.1 Summary of Main Findings

Pilot Experiment

Method:

The pilot study (N=40) was conducted off-line, recording participant responses via pencil and paper questionnaires. Participants rated the strength of associations they felt between target words in the auditory stimuli and images in the visual stimuli. Visual stimuli comprised image sets depicting objects and image sets composed of brand logos. Stimuli were recorded from one working-class and one middlle class Glaswegian male. Auditory stimuli comprised recordings of target words semantically related to target images in the visual stimuli. Target words were heard as the last word in a carrier sentence (*Please rate these images according to how strongly you associate them with the word* [...]). The semantic associations between the images in the visual stimuli and target words were normed on community outsiders (via a web-based *Mechanical Turk* task).

Results:

- No significant differences were found in listeners' reported associations depending on speaker heard
- No trends in listeners' reported associations were evident
- Participant associations were assumed to have been explicit (no response time measured)

Experiment 1
Method:
Experiment 1 (N=32) was conducted off-line, recording participant responses via pencil and paper questionnaires. Participants made forced choices of the images in the visual stimuli which they most strongly associated the target words in the auditory stimuli. Visual stimuli comprised image sets depicting objects and image sets composed of brand logos. Auditory stimuli was recorded from one working-class and one middlle class Glaswegian male, and two female distractor voices. Auditory stimuli comprised recordings of target words semantically related to target images in the visual stimuli. Target words in the auditory stimuli were heard as the last word in a carrier sentence (*Please choose the picture you most strongly associate with the word* [...]), The social class associations of the images in the visual stimuli were normed on community insiders, using locally relevant terminology (via pencil and paper norming questionnaire, N=32).

Results:

- No significant differences were found in listeners' reported associations depending on speaker heard

- Separate trends were observed in participant responses to image sets containing objects and those containing brand logos
- Participant associations were assumed to have been explicit (no response time measured)

Experiment 2
Method:
The experiment (N=42) was conducted on-line, recording participant eye movement in real-time. Participants made forced choices of the images in the visual stimuli which they most strongly associated the target words in the auditory stimuli (providing verbal reports of choices). Visual stimuli comprised image sets depicting objects and image sets composed of brand logos. Auditory stimuli were recorded from one working-class and one middle-class Glaswegian male, and two female distractor voices. Auditory stimuli comprised recordings of target words semantically related to target images in the visual stimuli. Target words in the auditory stimuli were heard as the last word in a carrier sentence (*Please choose the picture you most strongly associate with the word* [...]), The social class associations of the images in the visual stimuli were normed on community insiders, using locally relevant terminology (via pencil and paper norming questionnaire, N=32).

Results:

- Significant ($p<.05$) effects of speaker voice on participants' verbal choices of objects were observed, with listeners significantly more likely to verbally choose a middle-class object when the working-class speaker was heard and a working-class object when a middle-class speaker was heard
- Class-congruent trends were observed in participants' verbal choices of brand logos
- A significant ($p<.05$) effect of speaker voice on participants' fixations towards brand logos were observed, with participants fixating on working-class brands in significantly higher proportions when the working-class speaker was heard than when the middle-class speaker was heard

- The disparity between participants' fixations and their verbal reports suggests an implicit/explicit distinction, in line with previous social psychology research

Experiment 3
Method:
The eye tracking task (N=54) was conducted on-line, recording participant eye movement in real-time. Participants made forced choices of the images in the visual stimuli which they most strongly associated the target words in the auditory stimuli (via mouse clicks). Visual stimuli comprised image sets composed of brand logos. Auditory stimuli were recorded from four working-class and four middlle class Glaswegian males, with tokens from a synthesized voice used as distractor. Auditory stimuli comprised recordings of target words semantically related to target images in the visual stimuli. Target words were single word mono-tryllabic tokens. The social class associations of the images in the visual stimuli were normed on community insiders (via pencil and paper norming questionnaire, N=39). The subjective reaction test (N=60) gathered listener attribute ratings of stimuli speakers via pencil and paper questionnaires.

Results:

- Fronted CAT realisations — Significantly ($p<.05$) greater fixations towards working-class brands than middle-class brands at 300ms after the mean onset of /a/ realisations.

- Weakly-vocalised /l/ realisations — Significantly ($p<.05$) greater fixations towards working-class brands than middle-class brands at 700ms after the mean onset of /l/ realisations.

- Weakly-rhotic /r/ realisations — Significantly ($p<.05$) greater fixations towards working-class brands than middle-class brands from 500-600ms after the mean onset of /r/ realisations.

- Bunched /r/ realisations — Significantly ($p<.05$) greater fixations towards working-class brands than middle-class brands from 300-600ms after /r/ onset. Greater fixations towards middle-class brands at 900ms after the mean onset of /r/ realisations (marginally significant).

- Participant responses were observed from 300-700ms after the mean onset of socially-marked phonetic realisations, with some variants triggering faster associations than others.

Experiment 4
Method:
The subjective reaction test (N=60) gathered listener attribute ratings of speakers heard in the previous eye tracking experiment (Experiment 3) via pencil and paper questionnaires. Auditory stimuli consisted of recordings of each speaker reciting the words *can, mile, drinker, steer, tags,* and *double.* Participant ratings of 9 personality traits were aggregated via a principal component analysis which accounted for 62.3% of the variation in the data.

Results:

- No significant difference between ratings of working and middle-class speakers in terms of Component 1 traits (ambitious, interesting, and efficient)
- Middle class speakers were rated significantly ($p<.05$) more favourably than working-class speakers in terms of Component 2 traits (intelligent, independent, and 'more posh')
- Working and middle-class speakers were rated significantly ($p<.05$) more favourably in terms of Component 3 traits (pleasant, trustworthy, and straightforward) than the synthetic speech stimuli.
- The speaker with the highest frequency of middle-class-typical realisations (MC2) was rated significantly ($p<.05$) more favourably in terms of both Component 1 and Component 2 traits than any other speaker.
- With the exception of the synthetic voice, speaker WC4 was rated significantly ($p<.05$) less favourably than every other speaker in all component categories.

- Participant attribute ratings of speakers with the highest and lowest frequencies of middle-class-typical phonetic realisations suggest that the frequency of phonetic realisations had a cumulative effect on listener perceptions of status-related speaker traits.
- Female listeners found to have rated middle-class speakers significantly ($p=.003$) more favourably than male listeners in terms of perceived intelligence.[1]
- Female listeners found to have rated working-class speakers significantly more favourably than male listeners in terms of perceived intelligence ($p=.01$), trustworthiness ($p=.016$), efficiency ($p=.049$), and straightforwardness ($p=.0029$).

9.0.2 Research Questions

Overall, the findings appear to converge with previous research on implicit sociolinguistic cognition, with working-class and middle-class Glaswegian speakers and different socially-marked phonetic realisations eliciting differing implicit associations in listeners. While the pilot study and Experiment 1 did not reveal significant effects of speaker voice on listener associations, these served to trial the methodology before implementing eye tracking. They also allowed for the identification of methodological issues, which were addressed in subsequent experiments. Experiments 2 and 3 were then able to tackle the research questions formulated for this study, which can now be addressed as follows:

1. Does social information encoded within the speech signal impact upon the implicit associations made by listeners?

Experiment 2 (Ch.6) revealed participants to have been significantly ($p<.05$) more likely to fixate upon 'working-class' brand logos while hearing a working-class speaker than while hearing a middle-class speaker, suggesting an effect

[1] See p.189 for a discussion of gender effects.

of speaker social class on the implicit associations made by listeners. Conversely, participants' verbal choices of brand logos did not differ significantly depending on the speaker heard, suggesting that listeners make differing conscious and unconscious associations upon hearing speech. This is in line with Pantos & Perkins (2013), who found thathearing a speaker with an American English accent facilitated faster positive categorisations in an Implicit Association Test than hearing a Korean English speaker (indicating an implicit bias towards the American English speaker), but found participants to have favoured the Korean English speaker in an explicit task. The results also mirror previous research in social psychology, which found subjects to show implicit biases towards visual stimuli in the absence of explicit bias (Greenwald *et al* 1998; Karpinski & Hilton 2001; Inbar *et al* 2009). This appears to indicate that the social information which listeners derive from speech is implicitly evaluated in a similar manner to visually-derived social information.

2. Does socially-marked phonetic variation impact upon the implicit associations made by listeners?

Experiment 3 revealed different socially-marked realisations of the CAT vowel and post-vocalic/post-consonantal /l/ to have had significant ($p<.05$) effects on the brand logos fixated on by listeners, indicating that socially-marked phonetic variation triggers differing implicit associations in listeners. This effect was most prominent in listener fixations during fronted CAT and weakly-vocalised /l/ realisations, eliciting significantly ($p<.05$) greater fixations towards 'working-class' associated brand logos across multiple time-bins (for 400ms and 300ms, respectively), but was also observed at single time-points during retracted CAT vowel, clear /l/, and dark /l/ realisations (at 1,000ms after the onset of auditory stimuli in each case), with clear and dark /l/ realisations each eliciting significantly ($p<.05$) greater fixations towards 'middle-class' brand logs. This is in line with MacFarlane & Stuart-Smith (2012), who found different vocalised and clear /l/ realisations to have elicited different categorisations of speakers into working-class and middle-class guises, respectively.

Derhotic /r/ was found to have elicited significantly ($p<.05$) fewer fixations towards middle-class brand logos than any other image (including semantically unrelated distractor images) across two consecutive time bins (800-900ms after auditory onset). This suggests a strong affective response in the absence of a response to semantic information, indicating that this realisation was strongly dissociated from middle-class brands. The subjective reaction test found participants to have rated middle-class speakers significantly ($p<.05$) more favourably in terms of attributes on Zahn & Hopper's (1985) status dimension, with the speaker heard to have produced the highest number of typically-middle-class phonetic realisations being rated significantly ($p<.05$) more favourably in terms of these attributes than any other speaker. This patterns with Campbell-Kibler's (2012, 2013) findings on listener IAT response times towards speakers with Northern US /ɪŋ/ and /ay/ dipthongised realisations versus speakers with Southern US /ɪn/ and /ay/ monophthongised realisations. While the speech varieties investigated by Campbell-Kibler (2012, 2013) were regionally marked, they were also diverse in terms of social status — with Northern US speech varieties perceived as 'standard' compared to 'non-standard' Southern US speech varieties. Campbell-Kibler (2009) also found that /ɪn/ realisations elicited less favourable participant evaluations of status-associated attributes such as socio-economic status, education, and articulateness. This suggests a direct link between the perceived social status of speech varieties and, by extension, phonetic realisations linked to those varieties, and the implicit associations which listeners make towards speech.

3. What is the time-course of implicit sociolinguistic cognition?

Experiment 2 (Ch.6) provided a measure of the time course of implicit sociolinguistic cognition in relation to two speakers with differing social accents, with effects of speaker voice emerging at 1,150ms after the mean onset of the monosyllabic target words heard. Taking the mean duration of those target words into account, at 500ms, and factoring 200ms for a saccade to take place (as per Arnold & Tinker 1939; Salthouse & Ellis 1980; Salthouse textitet al 1981; Vaughan 1983), this gives a reaction time of 450ms from hearing an entire word to making a social evaluation between that word and an image. Using the duration of target words as a measure is problematic, however, as listeners are often able to make lexical decisions before hearing the end of words (Tanenhaus *et al* 1995).

Experiment 3 (Ch.7) provided a more precise measure, repeatedly showing listeners to respond to socially-marked phonetic variants with response times ranging from 300-700ms. Participants were found to have made significant shifts in fixation behaviour from 300ms following the mean onsets of fronted CAT and bunched /r/ realisation, from 500ms following the mean onset of weakly rhotic /r/ realisations, and from 700ms following the mean onset of weakly vocalised /l/ realisations. The response times while hearing some realisations (fronted CAT and bunched /r/) appear to suggest that listeners can react with similar reaction times towards linguistically-derived social information and visually-derived social information, with 300ms used as a benchmark for implicit responses in previous social psychological research on automatic evaluative responses (e.g. Greenwald *et al* 1998). Other response times appear to indicate that the processing of social information from speech can be more complex, and further investigation is required in this regard.

9.0.3 Theoretical Implications

In order to describe the mental processing, tracking, and storage of linguistic variation, Labov *et al* (2011) formulated the theory of the sociolinguistic monitor. This was proposed following a series of experiments (see p.34-37 for an overview) in which participants were asked to rate a newsreader's level of professionalism based upon an auditory recording of a passage which varied in concentrations of /ɪn/ and /ɪŋ/ realisations. The study found listener perceptions of the newsreader's professionalism to vary on a logarithmic curve according to the frequency of socially-marked phonetic variants, with audio samples containing more /ɪŋ/ realisations being consistently rated as more professional than those containing more /ɪn/ realisations. Drawing primarily from their experimental findings, Labov *et al* (2011: 457) ascribed the following properties to the sociolinguistic monitor:

Temporal Range:
: Extrapolating from their experiments, the temporal window of the monitor is reasonably wide: operating continuously across the 57-second time frame of their experiment trials.

Sensitivity:
: Adult subjects are consistent in their evaluation of sociolinguistic variables, sensitive to differences in frequency as small as 10 percent. Following the logarithmic curve found, speakers who follow this progression will react sharply to small percentage differences at low frequencies of a marked variable, but not for the same percentage differences at the high end. To the extent that the logarithmic relation governs subjective reactions, we cannot expect to obtain significant differences at increasingly high percentages of the marked variant.

Attenuation:
: The response of the monitor is not linear, but proportional to the increase in the number of marked forms observed.

Asymmetry:
: Listeners sensitivity to frequencies is radically different for the marked variant of a sociolinguistic variable that is unexpected in a given social situation. Sociolinguistic anomalies appear to be processed in the same way as semantic anomalies.

Gender:
: In the speech communities examined, women generally show more negative reactions to deviations from overt linguistic norms, a difference more evident at moderate rather than extreme frequencies.

Age of Acquisition:

> As with other aspects of sociolinguistic variation, sensitivity to frequency develops through adolescence. The logarithmic function appears to be fully defined among young adults. Responses of younger populations with lesser degrees of social consensus fit this function less precisely, but may display a significant linear response to the variable. (edited from Labov *et al* 2011: 457)

Of particular relevance to this thesis are the areas relating to the temporal window of the sociolinguistic monitor and the effects of listener age and gender on sociolinguistic perception.

While the examination of gender effects was not initially a primary focus of this research, a preliminary by-gender analysis of participant ratings of speaker personality traits in the subjective reaction test (table 9.1) shows female listeners to have rated 'middle-class' speakers significantly (p=.003) higher in terms of perceived intelligence than male listeners. While hearing 'working-class' speakers, female listeners were also found to have rated speakers significantly (p=.01) more favourably in terms of perceived intelligence than male listeners, but also rated speakers significantly higher in terms of how trustworthy (p=.016), efficient (p=.049), and straightforward (p=.0029) they perceived them to be. While a broad analysis based on self-reported speaker social class (which, as discussed in 8.3.1, is not a reliable predictor of listener perceptions), these results suggest that listener gender was very much a factor in the explicit speaker ratings made during the subjective reaction test. Due to time constraints, it was not possible to examine gender differences in fixation behaviour during the eye tracking experiments. Future analyses, however, are planned in order to determine the extent to which gender impacted on the less-conscious associations made upon hearing different socially-marked phonetic variants during Experiment 3, with the 50% participant gender split conducive to this. It may be expected here, in line with Labov *et al* (2011), that female listeners would have shown greater sensitivity than male listeners to the socially-marked variants heard during this task.

		Intelligent	Ambitious	Pleasant	Trustworthy	Efficient	Independe nt	Interesting	Straightforw ard	Poshness
Middle Class Speakers	Mean Female Rating	5.11	4.50	4.42	4.65	4.40	4.45	4.02	4.47	4.03
	Mean Male Rating	4.63	4.28	4.64	4.51	4.29	4.07	3.84	4.56	4.30
	Variance (p-value)	**.0033****	.2591	.1971	.3737	.5803	.0544	.3572	.6378	.0759
Working Class Speakers	Mean Female Rating	4.48	4.08	4.49	4.57	4.23	4.32	3.96	4.88	3.26
	Mean Male Rating	4.05	3.92	4.18	4.15	3.88	4.00	3.82	4.34	3.35
	Variance (p-value)	**.0104***	.3767	.0825	**.0161***	**.0492***	.0903	.4754	**.0029****	.6041

Table 9.1: Two-tailed unpaired t-test table of male and female listener ratings of personality traits of working and middle-class speakers, displaying p-values (Experiment 4).

Table 9.2 (p.190) shows a correlational analysis of listener age with ratings of speaker personality traits during the subjective reaction test. This was carried out taking all participant ratings into account, with 60 participants each rating 4 working-class and 4 middle-class speakers in terms of 9 personality traits — with the exception of 'poshness' ratings which, due in part to the layout of the subjective reaction test form (appendix 7, p.262), were omitted by three listeners. The analysis shows positive correlations between listener age and ratings of how intelligent (r=.132), ambitous (r=.139), trustworthy (r=.131), and efficient (r=.170) they perceived middle-class speakers to be. Similarly, listener age was found to positively correlate with listener ratings of how intelligent (r=.176), pleasant (r=.144), trustworthy (r=.219), efficent (r=.159), and straightforward (r=.157) they perceived working-class speakers to be. While these correlations appear to suggest that participant age had a marked effect on speaker personality trait ratings, with older listeners showing more favourable perceptions of speakers of both social classes, it is worth noting that the majority of subjects were drawn from the student population at the University of Glasgow. This resulted in an unbalanced sample in terms of participant age (M=25.5, SD=9.6), with only 20% (12/60) of participants aged 30 or over, and 11.6% (7/60) aged 40 or over, preventing firm conclusions from being drawn.

Speaker Trait Ratings by Participant Age		Intelligent	Ambitious	Pleasant	Trustworth y	Efficient	Independent	Interesting	Straight-forward	Poshness
Middle-class Speakers	Pearson Correlation	**.132***	**.139***	.115	**.131***	**.170****	.006	.049	.090	.092
	Sig. (2-tailed)	**.041**	**.031**	.074	**.043**	**.008**	.929	.447	.164	.167
	Total Ratings	240	240	240	240	240	240	240	240	228
Working-class Speakers	Pearson Correlation	**.176****	.034	**.144***	**.219****	**.159***	-.004	.069	**.157***	.014
	Sig. (2-tailed)	**.006**	.597	**.025**	**.001**	**.014**	.955	.289	**.015**	.837
	Total Ratings	240	240	240	240	240	240	240	240	228

Table 9.2: Correlation of listener age with ratings of speaker personality traits in the subject reaction test, by speaker social class (Experiment 4).

Labov *et al* (2011: 455) also examined 'real time' responses to socially-marked phonetic variation, through an experiment which tasked participants with moving an on-screen slider during a 100s audio passage in order to indicate the level of professionalism they perceived the stimuli speaker to have. The results are discussed in terms of the slider movements of a single participant, which are said to display a 'characteristic pattern', with slider movements shown to 'strongly correlate' with instances of /ɪn/ in the auditory stimuli (Labov *et al* 2011: 455). Debriefing questionnaires following the experiment also 'did not show a high level of conscious awareness of (ING)'. While Labov *et al* (2011) primarily focussed on frequency effects of a single socially-marked phonetic variable on listeners' social perceptions over an extended time window, the third experiment in this thesis examined aggregated effects of multiple realisations of three different phonetic variables over a short (1,600ms) temporal window, using an 'on-line' eye tracking methodology. The experiment revealed listeners to have reacted to different variants with response times ranging from 300-700ms following the mean onset of different socially-marked phonetic variants. Responses to some variants (fronted CAT and bunched /r/) were found to have occurred on the cusp of established thresholds of conscious awareness in social psychology (cf. Greenwald *et al* 1998) whereas responses to other variants did not (weakly rhotic /r/ and weakly vocalised /l/). Speculatively, the divergence in response time between variants may be indicative of varying levels of social-salience, with more socially-salient variants triggering socio-economic associations faster than variants which are less socially-salient. Given that 'there is no appreciable lag between what is fixated and what is processed' (Just and Carpenter 1980: 331), the findings suggest that the associations triggered by some variants are less conscious than the associations triggered by others — indicating that some socially-marked phonetic variants carry a greater cognitive processing cost than others.

Chapter 10

Conclusion

This thesis represents a preliminary investigation of implicit sociolinguistic cognition towards two socially-divergent speech varieties in Glasgow, providing evidence that different social accents elicit differing conscious and unconscious associations in listeners. Findings also indicate that different realisations of socially-marked phonetic variants trigger differing unconscious associations in listeners. This is in line with previous implicit sociolinguistic cognition research carried out on different regional and foreign accent varieties (Pantos & Perkins 2013; Campbell-Kibler 2012, 2013), suggesting that linguistically encoded markers of regional background and social class elicit automatic evaluative responses in listeners in much the same manner. This may be due to commonalities in listener evaluations of non-standard regional and working-class speech varieties versus standard 'prestige' and middle-class speech varieties — which provoke equivalent disparities in listener evaluations of speaker status and social attractiveness related attributes (Giles *el atl* 1975; Macaulay 1977; Preston 1999; Coupland & Bishop 2007; Campbell-Kibler 2009). This appears to suggest that such attitude dimensions are strongly tied to the automatic social evaluations which listeners make towards speech, presenting further avenues of investigation. Furthermore, the time course of listener responses to different socially-marked phonetic realisations, which were observed as occurring as early as 300ms in separate instances, is in line with the time course of automatic evaluative responses in social psychology research (Greenwald *et al* 1998; Payne 2001), suggesting that listeners automatically evaluate linguistically-derived social information in much the same manner as they evaluate visually-derived social information.

This thesis also serves as a test of a novel Visual World eye tracking methodology for investigating sociolinguistic perception, showing different social accents and socially-marked phonetic realisations to trigger fixations towards images carrying differing socio-economic connotations. The findings are encouraging for future investigations of sociolinguistic perception under this research paradigm.

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10.2 Appendices

.1

Social Evaluation Questionnaire
Pilot Study, Experiments 1 and 2 (Unrandomised)

Social Class Associations and Images

A Psycholinguistic Experiment by
Duncan Robertson, University of Glasgow

University of Glasgow

Please provide the following information before beginning the experiment:

Are you a Native Glaswegian? : *Yes* ☐ *No* ☐ Gender: *Male* ☐ *Female* ☐

Area of Residence: ______________

Age: ____ Is English Your First Language? *Yes* ☐ *No* ☐

Do You Speak Any Other Languages Fluently? *Yes* ☐ *No* ☐

Using the scales provided, please indicate which social class you would associate with each of the images displayed. The scale is calculated as follows:

1 = 'Neddy'
2 = Working Class
3 = Neutral / No Association
4 = Middle Class
5 = Posh

So, for example, if the image was of a monocle (above), you might feel that this has a posh association, and mark the corresponding scale as follows:

'Neddy' ☐ ☐ ☐ ☐ ☒ Posh
1 2 3 4 5

PECKHAM'S

'Neddy' ☐ ☐ ☐ ☐ ☐ Posh
1 2 3 4 5

Sainsbury's

'Neddy' ☐ ☐ ☐ ☐ ☐ Posh
1 2 3 4 5

FIAT

'Neddy' ☐ ☐ ☐ ☐ ☐ Posh
1 2 3 4 5

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

STARBUCKS COFFEE™

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

Waitrose

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

MasterChef

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

Cartier

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

D&G
DOLCE & GABBANA

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

K king's theatre

'Neddy' 1 2 3 4 5 Posh

berghaus

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

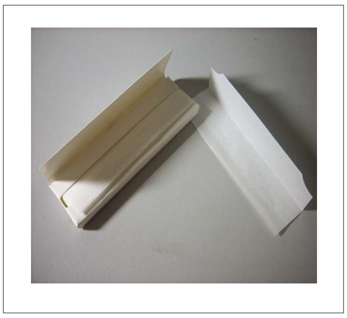
PRADA

'Neddy' 1 2 3 4 5 Posh

Warren James

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh



'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

Ford

'Neddy' 1 2 3 4 5 Posh

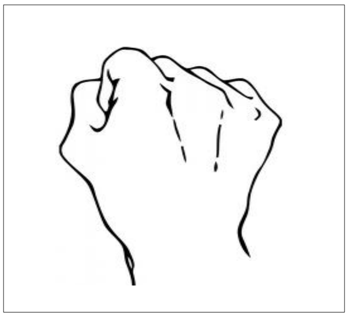
'Neddy' 1 2 3 4 5 Posh

LIDL

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh



'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy'	1	2	3	4	5	Posh

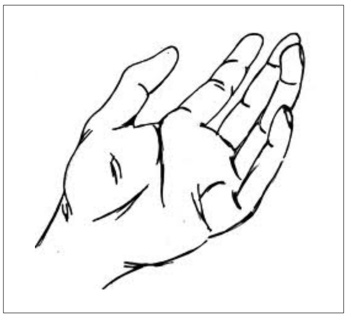
'Neddy'	1	2	3	4	5	Posh

Mercedes-Benz

'Neddy'	1	2	3	4	5	Posh

'Neddy'	1	2	3	4	5	Posh

'Neddy'	1	2	3	4	5	Posh



'Neddy'	1	2	3	4	5	Posh

buckfast
TONIC WINE

'Neddy'	1	2	3	4	5	Posh

Twister

'Neddy'	1	2	3	4	5	Posh

'Neddy'	1	2	3	4	5	Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

Trivial Pursuit

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

BMW

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

GREGGS

'Neddy' 1 2 3 4 5 Posh

NEMESIS NOW

'Neddy' 1 2 3 4 5 Posh

FONDÉ EN 1743
MOËT & CHANDON
CHAMPAGNE

'Neddy' 1 2 3 4 5 Posh

---

evian

'Neddy' 1 2 3 4 5 Posh

VAUXHALL

'Neddy' 1 2 3 4 5 Posh

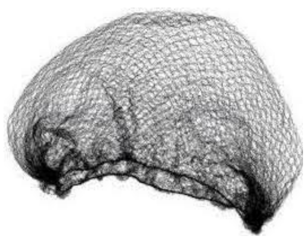
THE APPRENTICE

'Neddy' 1 2 3 4 5 Posh

SPAR

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh



'Neddy' 1 2 3 4 5 Posh

DRAGONS' DEN

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

MARKS & SPENCER

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

ASDA

'Neddy' 1 2 3 4 5 Posh

'Neddy' 1 2 3 4 5 Posh

John Lewis

'Neddy' 1 2 3 4 5 Posh

BURBERRY

'Neddy' 1 2 3 4 5 Posh

Audi

'Neddy' 1 2 3 4 5 Posh

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

BUPA

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

'Neddy' | 1 | 2 | 3 | 4 | 5 | Posh

Supplemental Questions:

How would you describe your own social class?

____

Did you feel there was strong association between the images shown and different social classes?

____

Any additional comments?

____

____

Thank You!

<u>*Researcher Use Only*</u>

Exp Version (A-C):

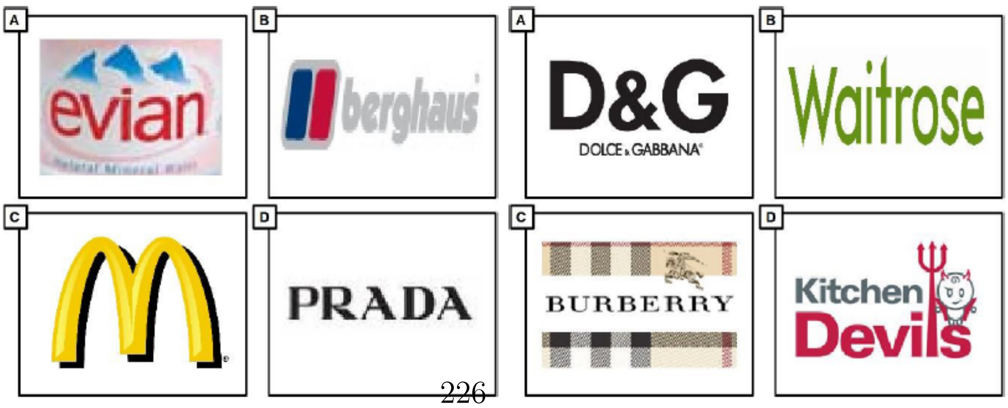
Subject No.

Likert. (1-7):

.2

Visual Stimuli

Pilot Study, Experiments 1 and 2



.2.
VISUAL STIMULI
PILOT STUDY, EXPERIMENTS 1 AND 2

A
I'M A CELEBRITY
Get Me Out Of Here!

B
buckfast
TONIC WINE

C
Ford

D
MOËT & CHANDON
CHAMPAGNE

A
evian

B
MasterChef

C
GLEN'S
VODKA

D
KIA

A
Audi

B
PRADA

C
Nando's

D

A
LAND ROVER

B
GREGGS

C
STARBUCKS COFFEE

D
Barrowland

A
Trivial Pursuit

B
Twister

C
LIDL

D
Warren James

A
THE SCOTTISH FOOTBALL ASSOCIATION

B
TESCO

C
John Lewis

D
SCOTTISH
RUGBY

A SCOTTISH RUGBY

B Waitrose

C FIAT

D TESCO

A PECKHAM'S

B buckfast TONIC WINE

C SPAR

D Trivial Pursuit

A DRAGONS' DEN

B I'M A CELEBRITY Get Me Out Of Here!

C berghaus

D MARKS & SPENCER

A THE APPRENTICE

B GREGGS

C Sainsbury's

D BIG BROTHER

A ASDA

B king's theatre

C Barrowland

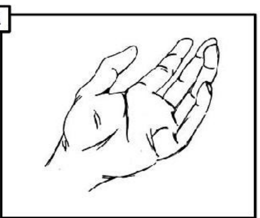
D BURBERRY

A MasterChef

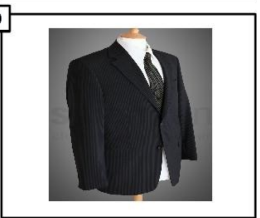
B PECKHAM'S

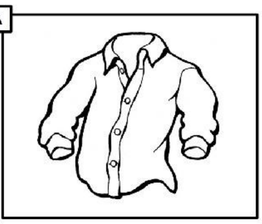
C READY STEADY COOK

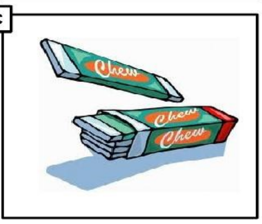
D GLEN'S VODKA

A

B

C

D


A

B

C


D


A

B

C

D


A

B

C

D


A

B

C

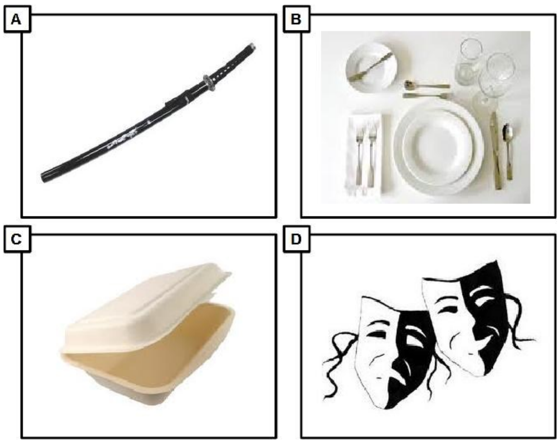
D


A

B

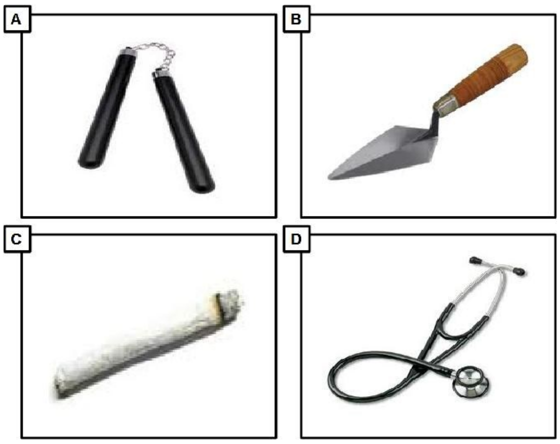
C

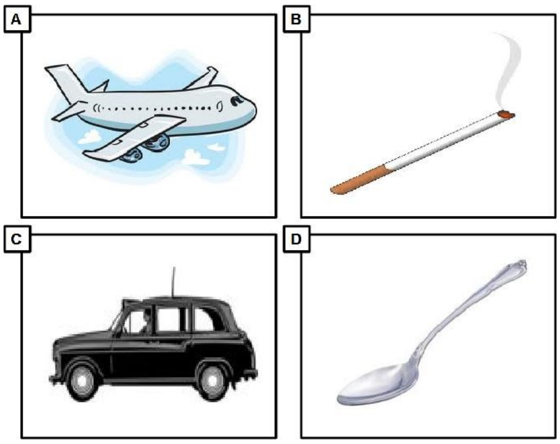
D



A
B
C
D

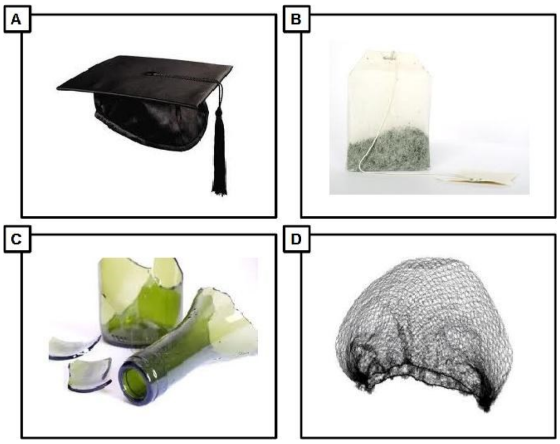

A
B
C
D


A
B
C
Chew
Chew
Chew
D


A
B
C
D


A
B
C
D

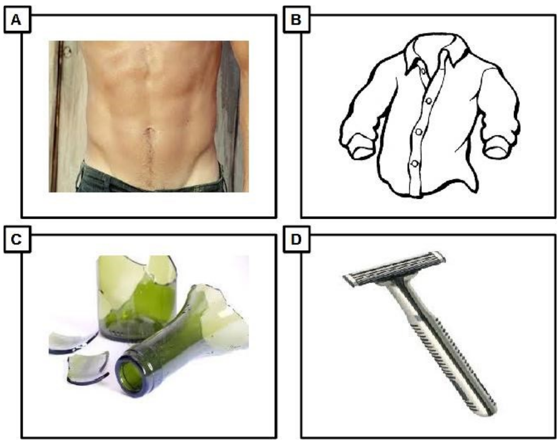

A
B
C
D

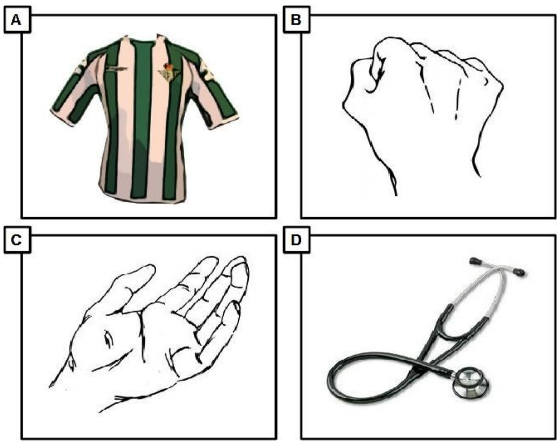

A
B
C
D

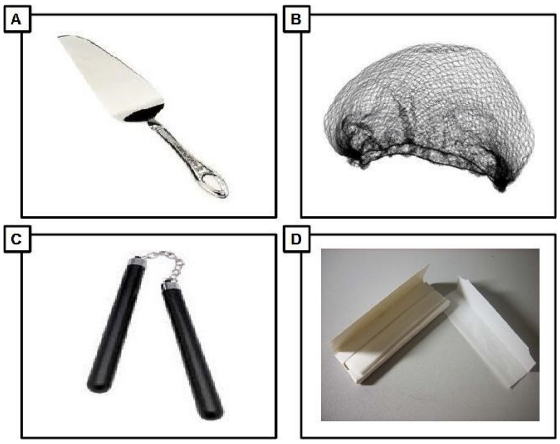

A
B
C
D


A
B
C
D

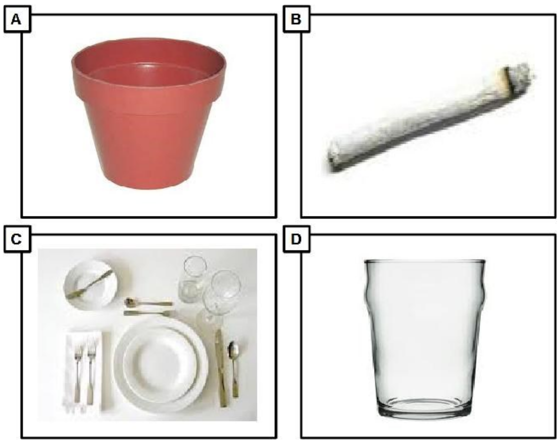

A
B
C
D


A
B
C
D


A
B
C
D

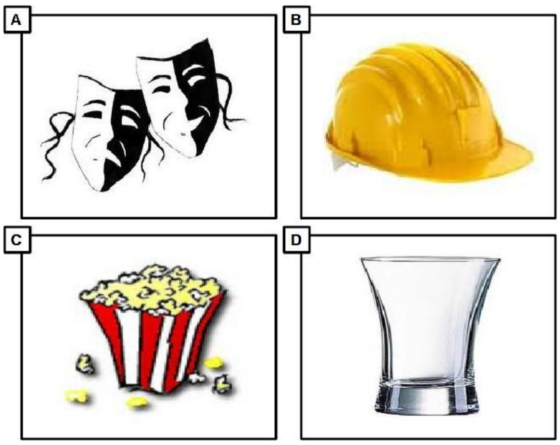

A
B
C
D


A
B
C
D


A
B
C
D


A
B
C
D


A
B
C
D


A
B
C
D

.3

Word Association Task

Experiment 3

WORD ASSOCIATION TASK

Please read aloud the semantically related missing terms on each row, the first letter of each are provided for you. If you get stuck, please ask the experimenter for more letters.

Alcoholic	One who drinks	D _ _ _ _ _ _
Ask for	Demand	O _ _ _ _
Bags	Wolf	P _ _ _
Barbecue	Toast	G _ _ _ _
Bin	Carrier	B _ _
Bite	Chew	N _ _ _ _ _
Bread	Filling	S _ _ _ _ _ _ _
Car	Bus	V _ _ _ _ _ _
Car	Garage	M _ _ _ _ _ _ _
Checkout	Cashier	T _ _ _
Consumer	Customer	S _ _ _ _ _ _
Dinner	Food	M _ _ _
Dram	Drink of choice	T _ _ _ _ _
Drink	Swig	G _ _ _
Drink Container	Metal	H _ _ F _ _ _ _
Eatable	Food	E _ _ _ _ _
Food	Light Meal	S _ _ _ _
January	Half-price	S _ _ _
Kilometer	Yard	M _ _ _
Knife	Spoon	F _ _ _
Labels	Price	T _ _ _
Lager	Ale	B _ _ _
Lettuce	Caesar	S _ _ _ _
Meal	Food	D _ _ _ _ _
Merit	Medal	B _ _ _ _
Motor	Cooking	O _ _
Petrol	Stove	G _ _
Pub	Tavern	B _ _
Run	Sprint	D _ _ _
Serviette	Paper	N _ _ _ _ _
Shop	Grocery	S _ _ _ _
Shopping	Park	R _ _ _ _ _
Single	Triple	D _ _ _ _ _
Sink	Faucet	T _ _
Stacking	Book	S _ _ _ _
Starve	Famish	H _ _ _ _ _
Steering	Tire	W _ _ _ _
Stick	Shift	G _ _ _
Thanks	To your health	C _ _ _ _ _

Tie	Collar	S _ _ _ _
Till	Checkout	C _ _ _ _ _ _
Tin	Soda	C _ _
Top-up	Have Another	R _ _ _ _ _
Drive	Guide	S _ _ _ _
Ultrasound	X-Ray	S _ _ _
Vehicle	Automobile	C _ _
Wheel	Rubber	T _ _ _
Window	Pane	G _ _ _ _

.4

Brand Evaluation Questionnaire Experiment 3 (Unrandomised)

BRAND EVALUATION QUESTIONNAIRE

Please rate each of the following brand logos based on **how posh** you feel they are, using the scales provided (where the leftmost circle = least posh, and the rightmost circle = most posh). If you do not recognise a brand, then please base your assessment on your impression of the logo provided. Thank you for helping with this research.

Please provide the following details to assist with our analysis, all responses will be kept anonymous:

Age: ______ **Gender:** M / F (delete as appropriate)
Area of Glasgow you call home:____
Social background: Working class / Middle class (delete as appropriate)

ALDI ○ ○ ○ ○ ○ ○ *more posh*	ASDA ○ ○ ○ ○ ○ ○ *more posh*	Audi ○ ○ ○ ○ ○ ○ *more posh*	b&m ○ ○ ○ ○ ○ ○ *more posh*
BACARDI. ○ ○ ○ ○ ○ ○ *more posh*	Bella Italia ○ ○ ○ ○ ○ ○ *more posh*	BENTLEY ○ ○ ○ ○ ○ ○ *more posh*	BMW ○ ○ ○ ○ ○ ○ *more posh*
BREW DOG PUNK IPA post modern classic pale ale ○ ○ ○ ○ ○ ○ *more posh*	Pub Food Brewers Fayre as it should be ○ ○ ○ ○ ○ ○ *more posh*	buckfast TONIC WINE ○ ○ ○ ○ ○ ○ *more posh*	BURGER KING ○ ○ ○ ○ ○ ○ *more posh*
CAFÉ ROUGE ○ ○ ○ ○ ○ ○ *more posh*	Carlsberg ○ ○ ○ ○ ○ ○ *more posh*	CHIVAS REGAL 12 ○ ○ ○ ○ ○ ○ *more posh*	CITROËN ○ ○ ○ ○ ○ ○ *more posh*

co-operative ○ ○ ○ ○ ○ ○ *more posh* →	COSTA COFFEE SINCE 1971 ○ ○ ○ ○ ○ ○ *more posh* →	DEBENHAMS BRITAIN'S FAVOURITE DEPARTMENT STORE ○ ○ ○ ○ ○ ○ *more posh* →	Domino's Pizza ○ ○ ○ ○ ○ ○ *more posh* →
DUNNES STORES ○ ○ ○ ○ ○ ○ *more posh* →	EAT. THE REAL FOOD COMPANY ○ ○ ○ ○ ○ ○ *more posh* →	farmfoods THE FROZEN FOOD SPECIALISTS ○ ○ ○ ○ ○ ○ *more posh* →	FIAT ○ ○ ○ ○ ○ ○ *more posh* →
FINLANDIA VODKA ○ ○ ○ ○ ○ ○ *more posh* →	Ford ○ ○ ○ ○ ○ ○ *more posh* →	F ○ ○ ○ ○ ○ ○ *more posh* →	Glenfiddich ○ ○ ○ ○ ○ ○ *more posh* →
GLEN'S VODKA ○ ○ ○ ○ ○ ○ *more posh* →	GREGGS ○ ○ ○ ○ ○ ○ *more posh* →	GREY GOOSE The World's Best Tasting Vodka ○ ○ ○ ○ ○ ○ *more posh* →	HARDYS The best of Australia since 1853 ○ ○ ○ ○ ○ ○ *more posh* →
Harry Ramsden's World Famous Fish & Chips ○ ○ ○ ○ ○ ○ *more posh* →	H&M ○ ○ ○ ○ ○ ○ *more posh* →	Hoegaarden witbier-bière blanche ○ ○ ○ ○ ○ ○ *more posh* →	HONDA ○ ○ ○ ○ ○ ○ *more posh* →

HOUSE OF FRASER	Iceland	JAGUAR	Jamie's ITALIAN
more posh	*more posh*	*more posh*	*more posh*
JIM BEAM	John Lewis	KFC	KIA
more posh	*more posh*	*more posh*	*more posh*
La Tasca	LAPHROAIG SINGLE ISLAY MALT SCOTCH WHISKY	Leffe	LIDL
more posh	*more posh*	*more posh*	*more posh*
MAGNERS IRISH CIDER Original	MARKS & SPENCER	MATALAN MAKES FASHION SENSE	mazda
more posh	*more posh*	*more posh*	*more posh*
McDonald's	Mercedes-Benz	MITSUBISHI	M MORRISONS
more posh	*more posh*	*more posh*	*more posh*

Nando's	new look	NISSAN	PECKHAM'S SCOTLAND
○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →
PEUGEOT	PIZZA EXPRESS	Pizza Hut	Poundland
○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →
PORSCHE STUTTGART	★ PRET A MANGER ★	PRIMARK	RENAULT
○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →
RIVER ISLAND	ROLLS RR ROYCE	RUSSIAN STANDARD VODKA AS IT SHOULD BE	Sainsbury's
○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →
SEAT	ŠKODA	smart open your mind.	SMIRNOFF
○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →	○ ○ ○ ○ ○ ○ more posh →

STARBUCKS COFFEE ®	STOLICHNAYA RUSSIAN VODKA	STRONGBOW	SUBARU
○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*
SUBWAY	T.G.I. FRiDAY'S	T ®	TESCO
○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*
THE FAMOUS GROUSE FINEST SCOTCH WHISKY	T·K·maxx	TOBY CARVERY	TOYOTA
○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*
TRIPLE DISTILLED Vladivar VODKA	VW	VOLVO	wagamama
○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*
WAITROSE	wetherspoon	WHYTE & MACKAY GLASGOW	YO! sushi
○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*	○ ○ ○ ○ ○ ○ *more posh*

.5

Brand Evaluation Ratings Experiment 3

Report

RATING

BRAND	Mean	N	Std. Deviation
Aldi	2.06	34	.952
ASDA	2.38	34	.779
Audi	4.85	34	.702
B&M	1.76	34	.781
Bacardi	3.44	34	.991
Bella Italia	3.76	34	1.103
Bentley	5.74	34	.567
BMW	5.09	34	.793
Brewer's Fayre	2.38	34	.985
Buckfast	1.06	34	.239
Burger King	1.65	34	.646
Café Rouge	4.12	34	.913
Carlsberg	2.56	34	.746
Chivas Regal	3.79	34	.978
Citreon	3.21	34	.770
Co-op	3.09	34	.996
Costa	3.50	34	.788
Debenhams	4.00	34	.921
Dominos	2.38	34	.779
Dunne's Stores	2.44	34	1.133
EAT	3.82	34	.999
Famous Grouse	3.56	34	1.186
Farmfoods	1.53	34	.563
FIAT	2.79	34	.687
Finlandia	3.62	34	.888
Ford	3.18	34	.904
Fosters	2.32	34	.806
Glen's Vodka	1.94	34	1.071
Glenfiddich	4.18	34	1.029
Greggs	1.79	34	.808
Grey Goose	3.91	34	1.215
H&M	2.97	34	.904
Hardys	3.41	34	1.019
Harry Ramsden	2.74	34	.963
Hoegaarden	3.65	34	1.098
Honda	3.24	34	.781
House of Fraser	4.94	34	.776
Iceland	1.53	34	.563
Jaguar	5.29	34	.629
Jamie's Italian	4.15	34	1.019

Report

RATING

BRAND	Mean	N	Std. Deviation
Jim Beam	3.09	34	.900
John Lewis	4.65	34	.734
KFC	1.76	34	.654
Kia	2.79	34	.845
La Tasca	3.79	34	.914
Laphroaig	4.79	34	1.008
Leffe	3.88	34	1.200
LIDL	1.62	34	.551
Magners	2.85	34	.892
Marks & Spencers	4.29	34	.871
Matalan	2.38	34	.985
Mazda	3.38	34	.985
McDonalds	1.50	34	.663
Mercedes Benz	5.15	34	.925
Mitsubishi	3.71	34	.871
Morrisons	2.59	34	.821
Nandos	2.94	34	.886
New Look	2.74	34	.864
Nissan	3.12	34	.844
Peckhams	4.59	34	1.131
Peugeot	3.24	34	.855
Pizza Express	3.74	34	.864
Pizza Hut	2.38	34	.697
Porsche	5.65	34	.544
Poundland	1.09	34	.288
Pret a Manger	4.35	34	.884
Primark	1.56	34	.660
Punk IPA	3.47	34	1.261
Renault	3.12	34	.808
River Island	3.62	34	1.074
Rolls Royce	5.88	34	.327
Russian Standard	3.79	34	1.175
Sainsburys	3.71	34	.938
SEAT	3.24	34	.855
Skoda	2.68	34	1.065
Smart	3.44	34	1.160
Smirnoff	3.09	34	.965
Starbucks	3.59	34	.892
Stolichnaya	3.09	34	1.215
Strongbow	1.82	34	.869

Report

RATING

BRAND	Mean	N	Std. Deviation
Subara	3.03	34	.937
Subway	2.38	34	.779
Tennants	1.82	34	.716
Tesco	2.79	34	.946
TGI Fridays	3.24	34	1.046
TK Maxx	2.44	34	.786
Toby Carvery	2.21	34	.946
Toyota	3.38	34	.779
Vladivar	3.24	34	.923
Volkswagen	3.85	34	.821
Volvo	3.53	34	.861
Wagamama	3.65	34	1.041
Waitrose	5.03	34	.904
Wetherspoons	2.32	34	.806
Whyte & Mackay	3.29	34	1.115
Yo! Sushi	3.32	34	.878

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Visual Stimuli
Experiment 3

Working class target:
Citroen
Middle class target:
BMW
Target word:
Gas
Variable: /a/

Working class target:
Peugeot
Middle class target:
Porsche
Target word:
Wheel
Variable: /l/

Working class target:
Seat
Middle class target:
Mercedes-Benz
Target word:
Gear
Variable: /r/

Working class target:
Jaguar
Middle class target:
Ford
Target word:
Mechanic
Variable: /a/

Working class target:
Skoda
Middle class target:
Audi
Target word:
Tyre
Variable: /r/

Working class target:
Fiat
Middle class target:
Bentley
Target word:
Dash
Variable: /a/

Working class target:
Kia
Middle class target:
Rolls Royce
Target word:
Car
Variable: /a/+/r/
(excluded from analysis)

Working class target:
Magners
Middle class target:
Glenfiddich
Target word:
Tipple
Variable: /l/

Working class target:
Strongbow
Middle class target:
Hardys
Target word:
Bar
Variable: /a/+/r/
(excluded from analysis)

Working class target:
Glen’s Vodka
Middle class target:
Whyte & Mackay
Target word:
HipFlask
Variable: /a/

Working class target:
Carlsberg
Middle class target:
Grey Goose
Target word:
Gulp
Variable: /l/

Working class target:
Foster
Middle class target:
Leffe
Target word:
Beer
Variable: /r/

Working class target: Buckfast
Middle class target: Jim Beam
Target word: Glass
Variable: /a/

Working class target: Tennants
Middle class target: Laphroaig
Target word: Refill
Variable: /l/

Working class target: Toby Carvery
Middle class target: Pizza Express
Target word: Dinner
Variable: /r/

Working class target:
Wetherspoon
Middle class target:
Wagamama
Target word:
Snack
Variable: /a/

Working class target:
Brewer's Fayre
Middle class target:
Bella Italia
Target word:
Grill
Variable: /l/

Working class target:
Subway
Middle class target:
La Tasca
Target word:
Hunger
Variable: /r/

Working class target:
Nandos
Middle class target:
Pret
Target word:
Sandwich
Variable: /a/

Working class target:
Dominos
Middle class target:
EAT
Target word:
Edible
Variable: /l/

Working class target:
Harry Ramsdens
Middle class target:
Café Rouge
Target word:
Fork
Variable: /r/

Working class target:
McDonald’s
Middle class target:
TGI Fridays
Target word:
Salad
Variable: /a/

Working class target:
Pizza Hut
Middle class target:
Jamie’s Italian
Target word:
Meal
Variable: /l/

Working class target:
Burger King
Middle class target:
Yo Sushi
Target word:
Order
Variable: /r/

Working class target:
KFC
Middle class target:
Costa Coffee
Target word:
Napkin
Variable: /a/

Working class target:
Greggs
Middle class target:
Starbucks
Target word:
Nibble
Variable: /l/

Working class target:
Matalan
Middle class target:
Debenhams
Target word:
Shirt
Variable: /r/

Working class target:
Primark
Middle class target:
River Island
Target word:
Bag
Variable: /a/

Working class target:
LIDL
Middle class target:
Sainsbury's
Target word:
Shelf
Variable: /l/

Working class target:
ALDI
Middle class target:
Marks & Spencer
Target word:
Store
Variable: /r/

Working class target:
ASDA
Middle class target:
Waitrose
Target word:
Pack
Variable: /a/

Working class target:
TK Maxx
Middle class target:
House of Fraser
Target word:
Till
Variable: /l/

Working class target:
B&M
Middle class target:
John Lewis
Target word:
Cashier
Variable: /a/+/r/
(excluded from analysis)

Working class target:
Poundland
Middle class target:
Peckham's
Target word:
Scan
Variable: /a/

Working class target:
Farmfoods
Middle class target:
The Co-operative
Target word:
Retail
Variable: /l/

Working class target:
Iceland
Middle class target:
H&M
Target word:
Sale
Variable: /l/

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Subjective Reaction Test Form Experiment 3

University of Glasgow

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

SUBJECTIVE REACTION TEST

Recordings of several different people will be played to you, one at a time. For each person heard, please indicate your first impressions of their personalities using the scales provided. For example, you would circle the scale like this if you felt that the person sounded extremely friendly:

Friendly (1) 2 3 4 5 6 7 Unfriendly

On the other hand, if you felt that the person sounded slightly unfriendly, you might circle the scale like this:

Friendly 1 2 3 4 (5) 6 7 Unfriendly

PLEASE LET THE EXPERIMENTER KNOW WHEN YOU ARE READY TO BEGIN.

Person
From your first impressions, do you think this person is:

Unintelligent	1	2	3	4	5	6	7	Intelligent
Ambitious	1	2	3	4	5	6	7	Unambitious
Pleasant	1	2	3	4	5	6	7	Unpleasant
Untrustworthy	1	2	3	4	5	6	7	Trustworthy
Efficient	1	2	3	4	5	6	7	Inefficient
Dependent	1	2	3	4	5	6	7	Independent
Interesting	1	2	3	4	5	6	7	Uninteresting
Manipulative	1	2	3	4	5	6	7	Straightforward

Please indicate how 'posh' you think this person sounds, using the scale below:

○ ○ ○ ○ ○ ○

Less posh ← → *More posh*

Additional Comments (optional): ....

Experiment Code:

Please turn over →

Person

From your first impressions, do you think this person is:

Unintelligent	1	2	3	4	5	6	7	Intelligent
Ambitious	1	2	3	4	5	6	7	Unambitious
Pleasant	1	2	3	4	5	6	7	Unpleasant
Untrustworthy	1	2	3	4	5	6	7	Trustworthy
Efficient	1	2	3	4	5	6	7	Inefficient
Dependent	1	2	3	4	5	6	7	Independent
Interesting	1	2	3	4	5	6	7	Uninteresting
Manipulative	1	2	3	4	5	6	7	Straightforward

Please indicate how 'posh' you think this person sounds, using the scale below:

○ ○ ○ ○ ○ ○

Less posh ⟷ *More posh*

Additional Comments (optional): ....

....

Person

From your first impressions, do you think this person is:

Unintelligent	1	2	3	4	5	6	7	Intelligent
Ambitious	1	2	3	4	5	6	7	Unambitious
Pleasant	1	2	3	4	5	6	7	Unpleasant
Untrustworthy	1	2	3	4	5	6	7	Trustworthy
Efficient	1	2	3	4	5	6	7	Inefficient
Dependent	1	2	3	4	5	6	7	Independent
Interesting	1	2	3	4	5	6	7	Uninteresting
Manipulative	1	2	3	4	5	6	7	Straightforward

Please indicate how 'posh' you think this person sounds, using the scale below:

○ ○ ○ ○ ○ ○

Less posh ⟷ *More posh*

Additional Comments (optional): ....

....

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Person

From your first impressions, do you think this person is:

	1	2	3	4	5	6	7	
Unintelligent	1	2	3	4	5	6	7	Intelligent
Ambitious	1	2	3	4	5	6	7	Unambitious
Pleasant	1	2	3	4	5	6	7	Unpleasant
Untrustworthy	1	2	3	4	5	6	7	Trustworthy
Efficient	1	2	3	4	5	6	7	Inefficient
Dependent	1	2	3	4	5	6	7	Independent
Interesting	1	2	3	4	5	6	7	Uninteresting
Manipulative	1	2	3	4	5	6	7	Straightforward

Please indicate how 'posh' you think this person sounds, using the scale below:

○ ○ ○ ○ ○ ○

less posh ⟷ *more posh*

Additional Comments (optional): ______________________________

____

In order to assist with analysis, please provide the following details:

Gender: __________ Age: _______ Area of Glasgow originally from: ______________________________

Area of Glasgow currently resident in: ______________________________ For how long? __________

Schools attended: ______________________________

Parents occupation(s): ______________________________

Parents place(s) of birth: ______________________________

How would you describe your social class? ______________________________

THANK YOU FOR PARTICIPATING.

END OF EXPERIMENT

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