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The influence of speaker information on the processing of the ING variable

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Abstract

The focus of this study is on the sociolinguistic variable ING, and how its canonical variant, -ing (*jumping*) and non-canonical variant, -in' (*jumpin'*) are processed with different prior information on the speaker. The aim of this study is to find out what effect certain regional and socioeconomic background information on a speaker has on listeners' reaction time and accuracy of words ending with -ing and -in'. Across three experiments, participants took part in the same lexical decision task with audio files of the same speaker. These audio files consisted of single words ending with -ing and -in', alongside fillers of real words and nonwords. In each experiment, participants were asked to identify the stimuli they heard as real words or nonwords. Participants of Experiment 1 formed a control group, and received no prior information on the speaker. Participants of Experiment 2 were told that the speaker they were about to hear was an upper-middle class man from Connecticut, a state associated with the -ing form. Participants from Experiment 3 were told that the speaker was a working-class man from Alabama, a state associated with the -in' form. It was hypothesised that words ending with -ing would be processed faster and more accurately identified as existing words across all three experiments, due to the canonicality advantage. This turned out to be the case. The second hypothesis was that words ending with -in' would be processed faster and more accurately identified as existing words in Experiment 3 (Alabama guise) than in the other two experiments, due to their association with the area in question. In addition, the accuracy of identifying words ending with -in' as existing words was expected to be higher in Experiment 3 compared to Experiment 1 and 2. The results show that this second hypothesis is not the case, and that both variants were processed in a similar speed and identified as accurate in a similar manner across all three experiments. These results are in support of the canonicality advantage, and show that speaker information turned out to have little to no effect on the processing of the ING variable.

Keywords: ING variable; variants -ing and -in’; speaker information; canonicality; English; phonological variation; sociolinguistics; lexical decision task

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1. Introduction

Each speaker of each language has their own way of pronouncing words. There are several factors that have an effect on a person's way of speaking. Take geographical background, for instance: a person born in the South of the United States is very likely to pronounce it *makin'* instead of *making*. This is a prime example of interspeaker variation, which encompasses the variation between speakers. However, that very same person might alter their speech in more formal contexts, and switch to pronouncing that same word as *making* when they are at, for instance, a high-profile political fundraiser (Purse, et al., 2022; Labov, 1966). A person's ability to alter their speech is an example of intraspeaker variation, or the phonological variation that can be found within one person (Purse et al., 2022, p. 46).

While there is a lot of phonological variation within languages and within people, each language still has forms of standardised speech, which are also known as canonical forms. These forms are not associated with a specific region, but rather with formal contexts (Labov, 1966). Previous research has shown that canonical forms seem to be easier to recognise, and therefore easier to process cognitively (Andruski et al., 1994; Racine & Grosjean, 2000; LoCasto & Connine, 2002). However, there are studies that question this so-called canonicality advantage (Gaskell & Marslen-Wilson, 1996; Deelman & Connine, 2001; Sumner & Samuel, 2005; Gow, 2001; Bürki et al., 2018; White, 2021). In order to test this, a sociolinguistic variable can be used as the focal point of a study. A commonly used variable in sociolinguistic research has been the variable ING, and is also at the centre of this thesis.

The variable ING is mainly used in progressive verbs ('He is *jumping* on the bed.'), and has two variants that are used most frequently: -ing (*jumping*) and -in' (*jumpin'*). When focussing on the use of these variants across the United States, -ing is mostly associated with the General American accent, an accent associated with regions like the East Coast or California. In addition, -ing is considered the canonical variant due to it being a reflection of the ‘dictionary’ pronunciation and its orthographic representation (Andruski et al., 1994; LoCasto & Connine, 2002). The non-canonical -in’ variant is often associated with a Southern, or Appalachian accent (Labov, 2001; Campbell-Kibler, 2007; Wolfram & Christian, 1976).

Due to -in’ being the non-canonical variant, one might expect this form to be processed slower than -ing, under any circumstances. White (2021), however, conducted an experiment in the form of a lexical decision task in which -in’ primes seemed to facilitate the processing of both -ing and -in’ targets. In other words, stimuli ending with either -ing or -in’ were processed faster when they were preceded by the non-canonical -in’ form, which contradicts the canonicality advantage.

The results of White’s (2021) experiment, however, could have turned out differently if participants were provided with prior background information on the speaker, which in previous research turns out to have an effect on the perception and expectation of a person’s speech (Campbell-Kibler, 2010; Wade, 2020). The geographical or socioeconomic background of the speaker may lead to listeners expecting -ing or -in’ to be used more frequently by the speaker, and therefore boosting the variant congruent with the supposed origins of the speaker. It is this notion that provoked the research question of this thesis:

- **How do speaker expectations affect listeners’ reaction times and accuracy in the processing of words containing the canonical variant -ing (*jumping*) and words containing the non-canonical variant -in’ (*jumpin’*)?**

The effect of speaker expectations on the processing of -ing and -in’ was tested in three experiments consisting of the same lexical decision task, in which participants were asked to listen to a sequence of words and nonwords, and press an assigned key to indicate whether they thought a word was real or not. Among the existing words were words ending with -ing and -in’, which were the critical stimuli of all three experiments. While the lexical decision task was the same in each experiment, the instructions in each experiment were different: participants of Experiment 1 received no prior geographic and socioeconomic background information on the speaker, participants of Experiment 2 were told that the speaker they were about to hear was a upper-middle class man from Connecticut, and the participants of Experiment 3 were told that the speaker was from Alabama and had a working class background. The results of Experiment 1 would form a baseline response, and were expected to show a higher processing speed and accuracy of the words ending with -ing. The results of Experiment 2 were also expected to favour the -ing form in terms of processing speed and accuracy, based on the speaker’s origins and socioeconomic background. The results of Experiment 3 were expected to favour the -ing form in terms of processing speed and accuracy as well, but it was also expected that the words ending with -in’, which would be more common in an Alabamian accent, would be processed faster and more accurately than in Experiment 1 and 2.

The structure of the thesis is as follows: first, a theoretical framework is provided, in which the relevant literature and previous research on the subject of this thesis is discussed. What follows is a detailed description of the method used to study the processing of words ending with -ing and -in’. At the centre of the methodology is the lexical description task that was performed across three different groups of participants. The results of the three experiments are presented afterwards. In this section, the focus is on the mean accuracy and mean reaction time of the critical stimuli, which are the words ending with -ing and -in’. These results are then interpreted in the discussion section, in which is discussed to what extent speaker expectations really affected the processing of the words ending with -ing and -in’. The conclusion section closes the thesis off with some final remarks.

2. Theoretical background

2.1 Phonological variation

In every language, pronunciation can vary both within and between speakers across a variety of dimensions. This is called sociolinguistically conditioned phonological variation. In the English language, one person can pronounce the four-wheeled vehicle as /kar/, while another person pronounces it /ka:/. This is an example of phonological variation; while the pronunciation is different, the same vehicle is being described. Phonological variation, like other categories of linguistic variation, can be linked to various sociolinguistic parameters (Schneider, 2011, p. 16), such as a speaker's gender, age, origin, or socioeconomic status (SES). That means that when a speaker pronounces it /ka:/, it could point to their British, upper-middle-class origins. The dropping of the syllable-final /r/ in British English is a form of interspeaker phonological variation: a person's speech either is or is not rhotic. As Purse et al. (2022) concisely put: ‘Different people speak differently, even when they are speaking what is ostensibly the same language’ (p. 10). An influential factor on a person’s pronunciation is the place where they are from. Certain accents and pronunciations are often associated with certain regions or urban areas. In the case of the United States, Labov et al. (2006) divided the country into six major regions in terms of dialect: Northeast, North Central, Inland North, Midland, West, and South. Each of these regions are associated with a set of distinctive features in terms of pronunciation. On the other hand, phonological variation also exists on an intraspeaker level. This means that one person's speech can change based on the context they are in. For example, people could hyperarticulate words when they find themselves in a more formal context, and, on the other hand, tend to use contractions like ‘gonna’ in a more informal context. These dimensions of variation, however, are not mutually exclusive. Take regional variation, for example. People from different regions sound different from each other, but even a single speaker from a region with a highly marked accent can learn to adjust their accent to fit more formal situations in which such an accent may be considered socially less desirable (Purse et al., 2022, p. 50). Non-rhotic pronunciations are an example of this kind of variation that differs both between and within people: New Yorkers are famously non-rhotic, but can switch to rhotic in a fancy store to fit the context (Labov, 1966). This shows that one person's accent, despite the important role their origin has on it, can be quite flexible.

Over the years, linguists have conducted many studies on phonological variation and sociolinguistic parameters. One of the most influential studies on the subject of phonological variation is Labov's on the linguistic variable /r/ in New York City (1966). His study focussed on the relation between speakers' SES and their use of the postvocalic /r/: rhotic pronunciations are the standard in the United States, while non-rhotic pronunciations are marked forms. The New York City accent is, as was mentioned in the previous paragraph, known for its marked non-rhoticity. Labov visited three department stores in New York City that each differed in SES, and asked a question to the employees in order to evoke the same answer in each store, namely one that would include the phrase *fourth floor*. Based on the employees' answers, Labov was able to detect a clear pattern: the phrase was more likely to contain /r/ sounds in the stores with a higher status, and /r/ sounds would sooner be dropped by employees in stores with a lower SES (Yule, 2014, p. 258). This signifies the importance of the link between the sociolinguistic parameter of SES and pronunciation, and highlights the significance of a person's background and the effect it has on their speech. Moreover, Labov's study also could point to the role of context and how it can alter a person's speech, as it should not be presumed that the employees in the fancier store were also of a similar SES. They could easily have altered their speech in order to fit the context, which is a prime example of intraspeaker variation. In sum, it might very well be the case that people's speech is mainly based on their origin and SES, but people could also alter their speech to fit the context they are in. In a more formal context, they might resort to using speech that is generally considered more standard and socially acceptable. When words are pronounced according to this more standard speech, they often surface as the canonical forms of these words.

2.2 Canonical forms

While phonological variation is a common phenomenon in all languages, there are still generally standardised forms of speech. Such a 'standard' pronunciation of a word, like it is displayed in a dictionary, is called the canonical form. Important factors in determining whether a form is canonical or not, are its phonetic transcription in the dictionary and its orthographic representation (Andruski et al., 1994; LoCasto & Connine, 2002). Canonical forms are, more often than not, not associated with a specific region, but rather with a certain context in which they are used. This context is mainly one with a more formal or more prestigious character. For instance, the canonical form of the evoked phrase *fourth floor* from Labov's (1966) study is pronounced with both /r/ sounds, /fɔːrθ flɔːr/ in American English, as it would be pronounced in a department store with a higher SES, and thus in an environment that is generally considered more formal and prestigious. Therefore, the non-rhotic pronunciation, /fɔːθ flɔː/, is a non-canonical form of the phrase in American English. The opposite would be the case in British English, in which rhoticity is often associated with environments of lower prestige (Trudgill, 1974), and /fɔːθ flɔː/ would thus be the canonical form (and, not coincidentally, the British dictionary pronunciation, yet not an accurate reflection of the orthographic representation).

From a processing and mental representation perspective, it would make sense to assume that listeners have easy access to canonical forms of words in their mental lexicon, which would allow them to recognise and process these forms more quickly than non-canonical forms. Non-canonical forms could deviate from the form that listeners stored in their mental lexicon. Listeners, therefore, could take more time to recognise and process these non-canonical forms. This so-called 'canonicality advantage' (Purse et al., 2022) hypothesis is supported in several studies (Andruski et al., 1994; Racine & Grosjean, 2000; LoCasto & Connine, 2002). LoCasto and Connine (2002) found, for instance, that two-and three-syllable words with a canonical unstressed vowel, or schwa, were rated as more acceptable than words containing the non-canonical deleted schwa. That means that a word like *boomerang* was deemed more acceptable and accurate when pronounced like /ˈbuːməræŋ/, and less so when pronounced like /ˈbuːmræŋ/. Canonically pronounced words (i.e., those with a word-internal schwa) were also shown to be processed faster than non-canonically pronounced words (i.e., without a word-internal schwa). LoCasto and Connine (2002 used a priming paradigm (see Section 2.5 for an explanation of this paradigm) to find out whether preceding canonical primes boosted the processing of canonical targets, which turned out to be the case. Moreover, they showed that non-canonical targets were boosted equally by both non-canonical and canonical primes. They argue that this shows that canonical primes cause such a big processing facilitation that it overcomes the phonological difference (canonical vs. non-canonical) between the prime and target. Racine and Grosjean (2000) also conducted a study on the processing of the schwa, but in French, and only those occurring in the first syllable. They found that words with a canonical schwa boosted word processing on a higher level than words with a non-canonical reduced schwa. To summarise, LoCasto and Connine (2002) and Racine and Grosjean (2000) were able to link canonical forms to the facilitation of the processing of non-canonical forms, which is in line with the canonicality advantage theory.

While a good number of studies seemingly support the canonicality advantage, there are also some that do not fully support this hypothesis (Gaskell & Marslen-Wilson, 1996; Deelman & Connine, 2001; Sumner & Samuel, 2005; Gow, 2001; Bürki et al., 2018; White, 2021). Bürki et al. (2018) conducted a study that, like Racine and Grosjean's (2000), focussed on the processing of words with a canonical schwa and a non-canonical deleted schwa in French. They researched the effect of variant type, frequency, and context. In order to find out whether words containing the canonical schwa are processed faster than words containing the non-canonical deleted schwa, they created three lexical decision tasks which focussed on the pronunciation of French words with a canonical schwa (*semaine*) and its non-canonical variant without a schwa (*s'maine*). The results of the experiment indicated that a canonicality advantage is found when there are 'differences in frequencies across variants' (Bürki et al., 2018, p. 506). There is, however, no canonicality advantage when variant frequency is no longer taken into account. This means that variant frequency is an important factor that affects the processing of certain variants. This factor will be discussed in a later section. Gaskell and Marslen-Wilson (1996) conducted an experiment on the processing of place-assimilated words, of which the pronunciation is affected by the sounds of other words surrounding them. They indicated that there is no priming advantage for non-assimilated words, which represent the canonical form. The place-assimilated, non-canonical form generated similar priming effects to the canonical form, showing that there is no canonicality advantage in this case, and that this phenomenon is not a given.

A more recent example that contradicts the canonicality advantage comes from White (2021). In her study on the processing of the ING variable, she asked whether canonical and non-canonical ING words were processed faster or slower when preceded by same- or cross-variant forms. This was done in a priming paradigm. White found that canonical -ing is processed equally fast by -ing and -in’ primes, showing no advantage in processing coming from canonical -ing primes. Furthermore, she found that non-canonical -in’ targets were processed faster when preceded by non-canonical -in’ primes than by canonical -ing primes; again, showing no advantage for canonical primes over non-canonical ones, and in fact showing a processing advantage coming from non-canonical forms. These results deviate from LoCasto and Connine (2002)'s findings and put the theory of the canonicality advantage into question. This shows that the findings of previous studies are not unanimous when it comes to the extent of the canonicality advantage, and more research is required. This current study aims to shed more light on this matter.

2.3 The ING variable

Each previously mentioned study on canonicality focusses on a certain variable within a language. At the centre of this thesis is the use of the ING variable (*walking* vs. *walkin'*) in North America. This variable has been studied extensively by multiple researchers (Cofer, 1972; Wolfram & Christian, 1976; Houston, 1985; Roberts, 1994; Labov, 2001; Campbell-Kibler, 2006, 2007, 2010; Hazen, 2008; Tamminga, 2014; Vaughn & Kendall, 2018); White, 2021) and with good reason. First of all, the ING variable does not have many phonological constraints. The most notable constraint would be that this variable only exists in unstressed syllables, which means that words like *ring* or *sting* are never pronounced *rin'* or *stin'* (White, 2021, p. 11). Secondly, another constraint would be its progressive dissimilation, which suggests that upcoming velar stops, like /k/ or /g/, favour the -in' variant, while upcoming alveolar stops favour the -ing variant (Cofer, 1972; Houston, 1985; Roberts, 1994; Campbell-Kibler, 2006, p. 23; White, 2021, p. 11). In other words, people tend to pronounce a word combination like 'sleeping cat' as /sli:pin kæt/, and 'sleeping dog' as /sli:piŋ dɒg/.

In general, the ING variable is found in words from five grammatical categories, which are quantifiers (*something, anything, nothing*), root-attached items (*housing, clothing*), monomorphemes (*ceiling, morning*), gerunds (the *scratching* of nails), and progressive verbs (I am *eating* a muffin) (Tamminga, 2014). Progressive verbs represent the most prominent of the categories within the ING variable; most spoken words ending in ING are progressive verbs. In addition, the variation between -ing and -in' is most prolific for words in this grammatical category.

The canonical form of words ending with ING is the -ing variant in all Englishes. The reason for the canonicality of this variant is mostly, as stated earlier, based on its orthographic representation, and its use in formal contexts. The dictionary pronunciation of American English is often referred to as the 'General American' accent. This accent is not tied to one certain region (White, 2021, p. 58), as it is often associated with more than one region, like the East Coast or California (Campbell-Kibler, 2007; White, 2021). The standardness of this regional accent means that of -ing and -in’, high -ing use is expected in these regions.

In contrast to its canonical counterpart, frequent -in’ use is associated with a specific region: the Southern states. According to Labov (2001), the in' variant is used most frequently in the South, compared to any other part of the United States. Campbell-Kibler (2007) was able to support this statement by performing a matched guise task, in which she asked respondents to assess the level of accentedness of three North Carolinian speakers. The respondents would listen to audio samples of these speakers; the only difference in their speech was the use of -ing and -in'. The results showed that the respondents steadily rated the speaker who used -in' as more accented than those who used -ing.

According to Wolfram and Christian (1976), the -in' variant is used most frequently by speakers from Appalachia. This region is mainly located in the South of the United States, and covers large parts of Kentucky, North and South Carolina, Georgia, Alabama, Mississippi, Tennessee, and all of West Virginia (Appalachian Regional Commission, n.d.). Hazen (2008) conducted an extensive study on English in Appalachia, and found that within this dialect, progressive verbs are pronounced with the -in' variant for on average 67% of the time. Quite remarkably, 92% of the Appalachian working class speakers uses the -in' variant for progressive verbs, while only 49% of the upper middle-class speakers from this region uses this variant. Hazen also found that people with college experience (from all social backgrounds) were more likely to use the canonical -ing variant than the -in' variant. This, once again, shows the influence of SES and education on someone's speech, and links back to interspeaker- and intraspeaker variation.

2.4 Speaker expectations

A person's way of speaking, whether it be influenced by regional background, SES, or context, also influences how that person is perceived by listeners. Research shows that listeners form expectations about their interlocutor's speech based on the way they sound. Wade (2020) performed an experiment in which she evoked certain representations of /aɪ/ vowel from participants, who had to do a word naming game. These representations were evoked by being exposed to the speech of a model talker. One of the model talkers had a Southern accent, but never produced the glide-weakened /aɪ/ vowel (*fahr* instead of *fire*), which is highly associated with Southern speech. Participants, however, tended to pronounce words with the /aɪ/ vowel in a glide-weakened manner. This proves that the expectations the participants had about the Southern speaker had more impact on their production of the /aɪ/ vowel than the Southern speaker's actual pronunciation of that vowel.

A speaker's use of the -ing and -in' variants could also influence a listener's perception or expectation of a speaker. The regional background of a speaker could lead listeners to expect the speaker to be more likely to use a certain variant (White, 2021, p. 58). When a listener is about to listen to a speaker from whom they know is from South Carolina, and whose voice they have never heard before, they are likely to expect their accent to be Southern, including the -in' variant in their speech. Listeners tend to base their expectations of the speaker on their prior knowledge of the speaker (Wade, 2020).

Listeners' expectations do not always have to be influenced by the regional background of a speaker; socioeconomic background can also play a part. Campbell-Kibler (2010) studied the influence of speaker information on their attitudes toward the ING variable. She performed a matched guise experiment in which she manipulated the information of the speakers in terms of educational background and personal experience, by saying they were either a professor, a political candidate, or a ‘professional’ within the field the speaker was talking about in the excerpts that were presented to the listeners. It is important to note that the ‘professionals’ in this study were told to be a farmer, social worker, or even a manager of an IT department. It is a bit odd to put all of these speakers in the same category, since their different professions are paired with vastly different speech and vocabulary, and not the same socioeconomic backgrounds or associations. Next to manipulating the information on the speakers, Campbell-Kibler also manipulated the use of -ing and -in' in the excerpts of each speaker through audio; two matching excerpts were created per speaker, which only differed in use of -ing and -in'. The results of the experiment showed that the supposed professors were considered 'more knowledgeable' when they used the -ing variant in their excerpt. Interestingly, the supposed professionals were considered 'more knowledgeable' when they made use of the -in' variant. This shows the importance of 'stylistic context' to the perception of the ING variable (Campbell-Kibler, 2010, p. 218).

There is, however, a possibility that a higher use and exposure to certain variants leads to familiarisation to those oft-recurring variants, which in turn could lead to a higher tolerance to hearing that variant in an incongruent situation. For instance, a speaker who is born and raised in Alabama, and still lives there, could be less taken off-guard by a Californian using the -in' variant, because they are used to that variant being heard and used repeatedly. A Californian, however, could be surprised by another Californian's use of that very same -in' variant, because they are not used to such a situation (White, 2021, p. 81). It would thus be interesting to investigate if expected or unexpected pronunciations of the ING variable have a significant impact on their mental processing.

2.5 Priming

Many of the studies mentioned in this chapter mainly use priming tasks (Gaskell & Marslen-Wilson, 1996; LoCasto & Connine, 2002; White, 2021). Priming is the phenomenon by which a word is processed faster when it is preceded by a word that is in some way (semantically, morphologically, phonologically) related to it. For example, priming occurs when a like *horse* is processed faster when it is preceded with a semantically related word like *donkey*. When *horse* is preceded by a semantically unrelated word like *kitchen*, it takes more time to retrieve it from the mental lexicon, and thus leads to slower processing. In a priming task, participants are presented with a sequence of words, some of which are targets (*horse*) and some of which are primes which are either related or unrelated to the target (*donkey*/*kitchen*). This is often presented in the form of a lexical decision task on a computer, in which nonwords are added to the sequence of primes and targets, and participants must press assigned keys on their keyboard to indicate whether a word is real or not. Subsequently, the participants' reaction time to the targets is measured and analysed to find out whether related primes influenced their processing speed, compared to unrelated primes. It is important to note that primes and targets can also be related on other levels than semantics: they may, for example, have the same affixes, which can also lead to the faster processing of a target (e.g., *therapist-linguist*, *contraband-contradict*). In the case of the ING variable, priming would occur when a target (e.g., *jumping*) is processed faster due to a prime that also ends with the same variable (e.g. *reading*) (Tamminga, 2014). White (2021) researched exactly this phenomenon. In addition, she focussed on the role of a non-canonical prime (e.g., *jumpin'*) on a canonical target (*reading*), and vice versa. She conducted an experiment in the form of a lexical decision task in which -in' primes seemed to facilitate the processing of both -ing and -in' targets. In other words, stimuli ending with either -ing or -in' were processed faster when they were preceded by the non-canonical -in' form. In fact, she found that the combination of -in' primes and -in' targets were processed faster than the other three possible pairs. Her results contradict the canonicality advantage theory, but also inspired the current study to find out whether the canonicality advantage resurfaces when priming elements are removed from the very same lexical decision task.

2.6 The current study & predictions

Although priming tasks are very informative in finding out what impact (non-)canonicality has on the processing of certain variables, they do not actually look at whether words containing the canonical or non-canonical variant are processed equally fast or not when 'unprimed' and just on their own. By removing the priming element to lexical decision tasks, this study aims to find out whether words containing the canonical -ing variant of ING (i.e., -ing) are processed faster than words containing the non-canonical variant of ING (i.e., -in'), as the literature on the canonicality advantage would suggest. Another goal of this study is to find out whether the reaction times of the -ing and -in' final words are affected by listener expectations as induced by regional and socioeconomic labelling of the speaker.

With the theoretical background stated in this chapter in mind, two hypotheses have been made. Based on the canonicality literature (Racine & Grosjean, 2000; LoCasto & Connine, 2002), the first hypothesis (H1) is that words containing the canonical -ing variant will be processed faster and more accurately (i.e., more likely to be identified as existing words) than words containing the non-canonical in' variant. The second hypothesis (H2) is that adding background information on the speaker will influence the speed and accuracy in which the words containing the -ing and -in variants are processed. That means that when participants are told that a speaker is from an area and socioeconomic background that is associated with high use of the -ing variant compared to the -in' variant, it will lead to a higher speed and accuracy in which words with that same variant are processed. In the experiments performed in this study, three groups of participants took part in a lexical decision task that included stimuli that ended with both -ing and -in'. The first group was a control group, who received no prior information on the speaker. The second group received a blurb about the speaker, which pointed out that he was an upper-middle class man from Connecticut. According to H2, it is expected that the words ending with -ing will be processed faster in this experiment, not only because of the canonicality advantage, but also because of its association to the region. The third group was informed that the speaker was a working-class man from Alabama. This group was expected to process words ending with -in' faster than in the participants in the other two experiments would, since the -in' form is highly associated with this area. The next chapter contains more details on the experiments that were performed to find out about the role of speaker expectation on the processing of -ing and -in'.

3. Methodology

The focus of this thesis is on the influence of speaker information on the processing of words ending with -ing or -in'. Three online experiments, consisting of a lexical decision task, were composed to learn more about the possible correlation between speaker information and listeners' processing time of words ending with -ing and -in’, and accuracy in which they identified these words as existing words. This chapter discusses information on the participants of the experiments, and a detailed description of the materials, design, and procedure. Finally, the manner in which the results were analysed is discussed.

3.1 Participants

A total of 104 American participants took part in this project, evenly split across three linked experiments. These participants were recruited through Prolific Academic, an online platform for recruiting participants to online experiments. They were compensated £7 per hour for their participation. Each experiment took about 15 minutes to complete, resulting in a compensation of £1.75. All participants were between the age of 18 to 65, and were selected based on their nationality (American), country of birth (USA), and their first language (English). Moreover, the pre-screening of all three experiments was set up in a way that participants who took part in one experiment did no longer qualify to participate in one of the other two experiments.

3.2 Materials

Using the programme PCIbex (Zehr & Schwarz, 2018), three online experiments were designed. Each experiment had a similar design; the only difference between the experiments, except for the random stimuli per participant, was the information on the speaker that was given before the lexical decision task.

The audio files used in all three experiments were also used in White's study (2021). Permission and access to use these stimuli was given by the latter for this study. These audio files contained words and nonwords spoken by an American male in his mid-twenties and with an upper-middle class background. He is from the state of Massachusetts, and has an accent that can be defined as General American. As was mentioned in Section 2.3, this accent is not tied to one distinct geographical area, except possibly the north-east of the USA (White, 2021, p. 58).

3.2.1 Critical stimuli and existing filler words

Within the lexical decision task, it was important to prevent participants from forming a response bias towards the stimuli. They were therefore exposed to an equal number of existing words and nonwords (200 of each category). Among the 200 existing words that were presented in the experiment, there are 80 critical ING stimuli. A full list of the critical stimuli can be found in Appendix I, and a full list of the filler stimuli can be found in Appendix II. In each experiment, half of these were presented with a word-final -ing, and half with an -in', counterbalanced across two lists such that each participant only saw one version of each ING word. All of the ING words are progressive disyllabic verbs.

Of the 200 existing words that were included in the experiment, 120 did not end with -ing or -in', and therefore acted as fillers. The reason these fillers were included, was to disguise the point of the experiment. It is likely that participants would become aware of the purpose of the experiment if a more notable number of stimuli ended with the ING variable. In such a scenario, it is likely that participants would become aware of words with this feature, and put more effort into responding more quickly to these stimuli, which would defeat the purpose of this experiment. That is why a selection of existing-word fillers with similar features were included as stimuli. These fillers were divided into three categories:

monomorphemes (*suit, riddle, flight*), words ending with -ment (*department, augment, shipment*), and words ending with -er (*easter, actor, corner*).

3.2.2 Nonwords

A portion of the 200 nonwords had some linguistic similarities to existing words. They were, for example, modified into nonwords by adding a consonant at the end (PLAYB and PAINK instead of *play and pain*), or by changing a consonant into another one (FRIENK and BROON instead of *friend* and *broom*). With these nonwords, participants were encouraged to remain focussed on the pronunciation of the whole (non)word, since the feature making it a nonword occurs at the very end. Other nonwords in the experiment had no similarities whatsoever to any existing words (GOWG, THWOXIT, TRAOR). Moreover, some nonwords show some similarity to existing words with features used in the exising-word fillers (ADVEMP, JOKERK, CLAIMANK). Finally, 32 ING-nonword stimuli were included (GREETIND, FOOLINT, RAGIND), meaning that not all ING-words were real words either. Participants were therefore encouraged to listen to the end of the ING words, too.

3.3 Design and procedure

Prolific users that were eligible for this experiment were notified when it was put online. Upon opening the experiment, participants were asked to read a consent form, and agree to participate to the study. Subsequently, they were reminded of the use of headphones and the requirement of working audio, which they could check by means of a test sound file.

The next portion of the experiment was very important, as it contained the instructions and the information on the speaker. Participants of Experiment 1 formed the control group; received no information about the speaker's background whatsoever, in order to form a baseline response. Participants of Experiment 2 were informed that the speaker is from Connecticut (General American accent), and has an upper middle-class background. To participants of Experiment 3, the speaker was announced to be from Alabama (Appalachian accent), and to have a working-class background. The speaker blurbs from experiment 2 and 3 can be found in Appendix III. After this section, participants were informed that the existing words could be pronounced in formal and casual ways. To get used to this, a practice round consisting of 30 stimuli was given before the actual experiment.

After the practice round, the main portion of this experiment commenced: the lexical decision task, in which the participants had to listen to the aforementioned audio samples of the male speaker from Massachusetts uttering existing words and nonwords. After each utterance, participants were asked to press the J-key on their keyboard when they thought they heard an existing word, and the F-key when they thought they heard a nonword. The lexical decision task consisted of a total of 400 stimuli: 40 words ending with -ing, another 40 ending with -in', 120 filler words, and 200 nonwords. Between each word was an inter-trial interval of 400-600ms (randomised per trial to avoid rhythmic responding).

3.3.1 Order

The order in which fillers of nonwords, fillers of existing words, critical stimuli, and ING-nonwords are presented, was modified to a certain degree. First, no critical ING stimuli would directly follow each other. For example, *jumping* would not be preceded by *thinkin'*, and vice versa. Two words ending with the same variant would also not be adjacent to each other (*brushing* - *dripping*). Second, ING-nonwords would also not be followed by either ING-nonwords or words ending with -ing or -in'. The reason for these two modifications was to distract participants from the critical features of this experiment. If critical stimuli and/or ING-nonwords occurred in pairs, participants would more likely become aware of their importance. That is why two or three nonwords and/or existing-word fillers are randomly put between critical stimuli. With this order in mind, the structure of all stimuli would be presented as is displayed in table 1, which is a sample of a possible sequence of 12 stimuli.

	Word	**Sequence**	**Type**
1	mending	ING	-ing
2	chursel	FILLER	nonword
3	liss	FILLER	nonword
4	meltint	ING	ING-nonword
5	lorest	FILLER	nonword
6	bankert	FILLER	er-nonword
7	busy	FILLER	er
8	nudgin	ING	-in
9	suit	FILLER	mono
10	gheetim	FILLER	nonword
11	linkin	ING	-in
12	garment	FILLER	ment

Table 1: a possible sample of the stimuli sequence.

3.3.2 Questionnaire

After finishing the lexical decision task, participants were asked to fill in a questionnaire that asked them to specify some demographic data, i.e., their age, gender, native language, childhood country. In addition, they were asked if they were either right- or left-handed, or ambidextrous, which could be taken into account in the analysis, in relation to the speed and accuracy in which one of the two keys were pressed. Furthermore, they were asked about where they thought the speaker was from, even if they were in one of the two groups that included information about the speaker at the beginning of the experiment. They were finally asked what they thought the experiment was about, and if they had any other comments on the experiment. Finally, after finishing the questionnaire, the results were sent to the PCIbex server, and a debrief was given with an overview of the experiment's design and purpose.

3.4 Analysis

The mean reaction time (RT) and mean accuracy of the critical stimuli were analysed after all of the responses to the experiments arrived. The mean RT, expressed in milliseconds, is the average speed in which all critical stimuli were processed from the onset. The mean accuracy expresses the overall percentage in which the critical stimuli were correctly identified as existing words.

Responses of participants who had an accuracy lower than 80% were removed from analysis. This resulted in the removal of five participants from Experiment 1, five from Experiment 2, and eight from Experiment 3.

For the analysis of the RTs, minimal a priori data trimming is combined with post-fitting model criticism by recommendation of Baayen (2010). According to post-fitting model criticism, 62 trials from Experiment 1 were excluded, as were 59 from Experiment 2, and 53 from Experiment 3. Then, all critical trials with an RT shorter than 200ms and longer than 2500ms were excluded from analysis. This resulted in the exclusion of 31 trials in Experiment 1, 17 in Experiment 2, and 26 in Experiment 3. Finally, all critical trials that were incorrectly identified as nonwords were also excluded from the analysis of the mean RT, leading to the removal of 311 inaccurate trials in Experiment 1, 301 in Experiment 2, and 211 in Experiment 3.

Linear mixed-effects models were used to analyse log-transformed RTs. Model criticism was performed to remove outliers, according to Baayen and Milins (2010) recommendation. The main effects incorporated in the mixed-effects model were as follows: WordType (ing/in), Frequency, and TrialNumber. Random intercepts for participants and word were included in the model. Model estimates and comparisons were obtained using the emmeans package in R (Bates et al., 2015), a programme used for data analysis. The data shown in the results section is based on the final linear mixed-effects model. P-values were calculated by using the emmeans package and are reported as significant at $p < 0.05$.

4. Results

In this chapter, the results the three experiments in terms of mean accuracy and mean RT are presented. The most important finding is that the prior speaker information given in Experiment 2 and 3 turned out to have had little effect on the processing of words ending with -ing and -in'.

4.1 Accuracy

The participants of Experiment 1 received no prior information on the speaker. After excluding 5 participants from analysis due to low accuracy, the results of 31 participants were analysed on speed and accuracy. The mean accuracy of these 31 participants was 88.7% of all stimuli. Of the critical stimuli, the participants show a mean accuracy of 95.2% for the words ending with -ing. Of the words ending with -in', a mean accuracy of 79.7% was established.

In Experiment 2, the participants were initially informed that the speaker was from Connecticut. The results of 30 participants (which remained after the exclusion of 5 participants due to low accuracy) were analysed. The remaining 30 participants had a mean accuracy of 88.7%, which is exactly the same mean accuracy percentage as the participants of Experiment 1. When focussing on the critical stimuli, 95.4% of the words ending with -ing and 79.5% of the words ending with -in' were accurately identified as existing words.

The prior information that was given about the speaker in Experiment 3 specified that 'Wade' was from the state of Alabama. The results of the 26 participants that remained after excluding 8 participants with low accuracy, showed a mean accuracy of all stimuli of 90%. In case of the critical stimuli, 97.5% of the words ending with -ing were identified as existing words. A mean accuracy percentage of 82% was established for the words ending with -in'.

Note that, although accuracy was not analysed statistically, the accuracy to -in' trials is lower than to -ing trials, which is in line with the results from White's study (2021). Figure 1 shows how the mean accuracy of both -ing and -in’ looks very similar across all three experiments.

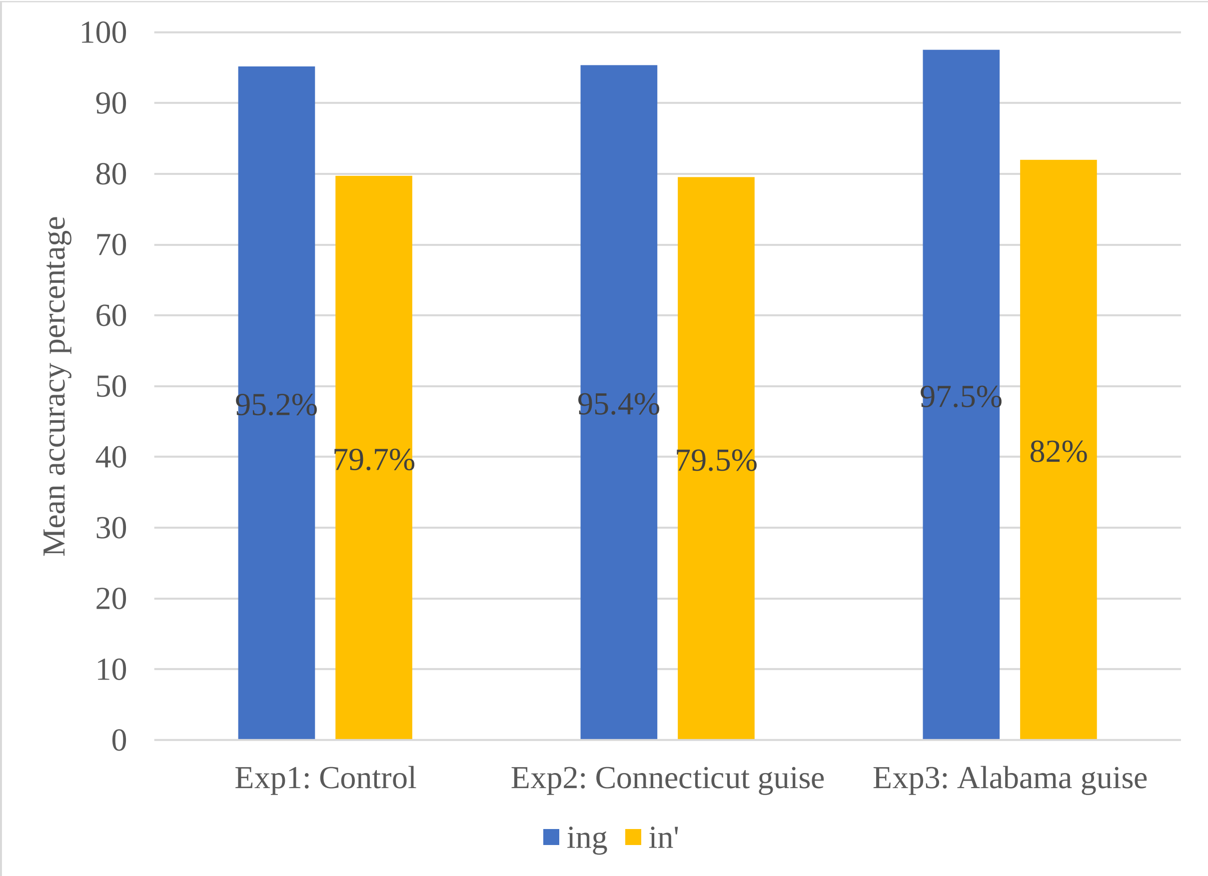

Figure 1: The mean accuracy percentage across Experiment 1-3.

4.2 Processing speed

The RT results of the three experiments are presented in Table 2 and Figure 2. In Experiment 1, the mean RT of the words ending with -ing was 1025ms. The words ending with -in’ had a mean RT of 1104ms. There is a significant 79ms difference between the RTs to -ing words and the RTs to -in words in Experiment 1 ($\beta = 0.07$, $p < 0.001$). Of the remaining predictors of Experiment 1, TrialNumber ($\beta = 0.004$, $p = 0.21$) indicates that participants do not get slower or quicker as the experiment progresses because this is not a significant factor.

Furthermore, Frequency (β = -0.02, $p < 0.01$) indicates that as the log-transformed frequency of the word gets bigger (so more frequent), the word is processed significantly faster (as expected).

In Experiment 2, the mean RT of the critical trials ending with -ing was 1027ms, and those ending with -in' had a mean RT of 1099ms. The 72ms difference between the RTs of words ending with -ing and the RTs of words ending with -in' is significant (β = 0.07, $p < 0.001$). Of the remaining predictors of Experiment 2, TrialNumber (β = 0.0009, $p = 0.75$) indicates that participants do not get slower or quicker as the experiment progresses because this is not a significant factor. Moreover, Frequency (β = -0.04, $p < 0.001$) indicates that as the log-transformed frequency of the word gets bigger (so more frequent), the word is processed significantly faster (as expected).

In Experiment 3, the mean RT of critical stimuli ending with -ing was 1063ms, and those ending with -in' had a mean RT of 1134ms. Once again, a significant 71ms difference was found between the RTs of the words ending with -ing and the RTs of the words ending with -in' (β = 0.07, $p < 0.001$). Of the remaining predictors of Experiment 3, TrialNumber (β = 0.003, $p = 0.34$) indicates that participants do not get slower or quicker as the experiment progresses because this is not a significant factor. Furthermore, Frequency (β = -0.03, $p < 0.0001$) indicates that as the log-transformed frequency of the word gets bigger (so more frequent), the word is processed significantly faster (as expected).

	Mean RT (SD) in ms to -ing words	Mean RT (SD) in ms to -in' words
Exp1: Control	1025 (118)	1104 (128)
Exp2: Connecticut guise	1027 (117)	1099 (115)
Exp3: Alabama guise	1063 (107)	1134 (115)

Table 2: the mean RT in ms of the critical stimuli across all three experiments. Standard deviations are shown in parentheses.

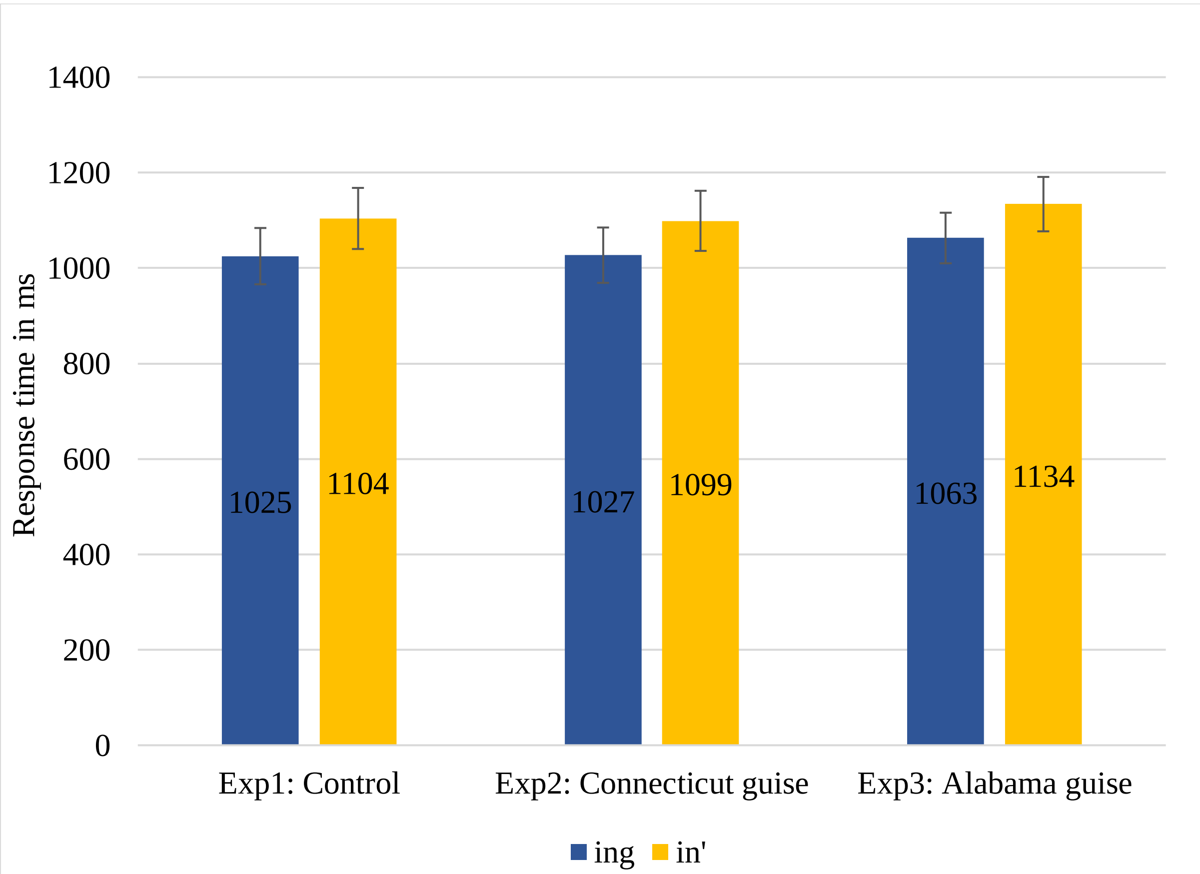

Figure 2: the mean RT of the critical stimuli across all three experiments.

5. Discussion

This chapter discusses the implications of the accuracy and RT results for the canonicality advantage literature. Next, it considers the role of speaker expectations in the processing of ING variation. Finally, limitations and future directions are discussed.

5.1 Mean accuracy and the canonicality advantage

The results in terms of mean accuracy showed that, in accordance with H1 and the canonicality advantage, words ending with non-canonical -in’ were more likely to be identified as nonwords than words ending with canonical -ing. The results of Experiment 1 in terms of accuracy were as expected: the mean accuracy for the words ending with -ing seem to be higher (95.2%) than the mean accuracy of the words ending with -in’ (79.7%). This means that participants seem to be more likely to identify non-canonical -in’ words as nonwords. Experiment 2 garnered similar results: -ing words and -in’ had a mean accuracy of 95.4% and 79.5%, respectively. Considering the prior information on the speaker that was given in this experiment, namely that he was a middle-class, well-educated Connecticuter, these results are as expected, as the -ing variant is more likely to be associated with a Northeast accent. According to this logic, I expected that the mean accuracy of the -in’ form, which is associated with Southern or, more specifically, Appalachian accents, would at least be higher than in the previous two experiments. This turned out to be the case, but only minimally: 82% of the -in stimuli were accurately identified as existing words. These results suggest that there is a canonicality advantage when it comes to the processing of -ing words, even when the canonical variant is not associated with the accent of the speaker.

5.2 Mean accuracy similarities across experiments

The most interesting observation within the accuracy results is the similarities between the percentages of -ing and -in’ stimuli across all three experiments. The percentages are essentially the same (95.2% and 79.7% in Experiment 1, 95.4% and 79.5% in Experiment 2, and 97.5% and 82% in Experiment 3), even though each experiment had completely different participants. The only difference between Experiment 2 and 3 was the prior information on the speaker, and participants of Experiment 1 received no prior information at all. Therefore, it turns out that the prior speaker information does not seem to have any effect on whether participants responded correctly or incorrectly to -ing and -in’ words.

5.3 RT and the canonicality advantage

The hypotheses posited in Section 2.6 of this thesis concerned the relationship between canonicality of the variants and their processing speed. The first hypothesis (H1) that was made before carrying out the experiments was that words containing the canonical -ing variant would be processed faster than words containing the non-canonical -in’ variant. The canonicality advantage literature led to H1 for the reasons that there seemed to be a clear pattern across several studies (Racine & Grosjean, 2000; LoCasto & Connine) of canonical variants being processed faster than non-canonical variants. However, sociolinguistic work on speaker expectations (Campbell-Kibler, 2010; Wade, 2020; White, 2021) led to H2: adding background information on the speaker that is congruent with the -ing (Connecticut) -and -in’ (Alabama) variant will lead to a higher processing speed of words containing these variants. The main motivation for this hypothesis was that the aforementioned studies showed that speaker expectations seemed to have a boosting effect on the processing of variants that were congruent with the prior information given about the speaker.

After analysis, it can be concluded that H1 turned out to be the case across all three experiments. H2, however, was not verified, since critical -in' stimuli were not processed faster in Experiment 3, which included speaker information that was congruent with the -in' variant, with the participants being told that 'Wade' was from Alabama.

The difference in ms across all three experiments is very similar. The 79ms difference between the -ing and -in' stimuli in Experiment 1 is very close to the 72ms difference between ing and -in' in Experiment 2. Experiment 3 shows an -ing-in' difference of 71ms, this is clearly also in the same ballpark as the difference in the previous two experiments. These findings are in line with the canonicality advantage theory, but also contradict H2. It shows that canonical forms are more readily available in the mental lexicon, despite being told that the speaker is from a certain region in which the canonical form is less likely to be used.

In White's (2021) experimental results, some of the experiments do show a slight difference in the control conditions between the processing of -ing and -in', although this did not come out as significant. The results from the current study suggest that this is a real difference that should be taken into account, and that perhaps with a higher-powered design, she would have found this to be significant.

5.4 The role of speaker information

The similar RTs across experiments might suggest that the role of speaker information could be less influential than expected. This is in contradiction with Wade (2020): she found that the expectations listeners had of the speaker had more of an impact on the production of variants associated to a certain accent than the speaker's actual pronunciation of those variants did. It is important to note, however, that Wade's (2020) research focused on the production of expected speech variants rather than the perception of expected speech variants. The speaker labels in her study boosted the production of expected speech variants, while the labels in this study had seem to have little to no effect on the processing, or reception, of the expected variants. It is perhaps this difference between production and reception that generate the different outcomes of this study and hers. Different systems may be influenced in different ways by social information. In other words, specific speaker expectations might not play a role in the processing of phonological information.

The lack of difference between RTs across experiments might also suggest that many participants did either forget the prior background information on the speaker in Experiment 2 and 3, or were very aware of the incongruency of certain variants in combination with the given information. This can be deduced from the answers to one of the questions in the questionnaire: ‘Where do you think the speaker is from?’. In both experiments, many participants gave a very broad answer, such as ‘USA’ or ‘America’. Some others guessed that ‘Andrew’ or ‘Wade’ was from a region that was never mentioned in the instructions, like the Midwest. In Experiment 2, only 10 participants proved that they read and remembered the instructions, by answering ‘Connecticut’. In Experiment 2, 12 participants indicated that they thought ‘Wade’ was from Alabama. Some, however, implied that they had their doubts about Wade’s origin (‘The instructions said he was from Alabama.’). It is clear that many participants were aware of the guise that was given to the speaker, and that this might have had an effect on the accuracy and RT of the critical stimuli. Moreover, most of the participants of Experiment 1, who formed the control group and received no prior speaker information whatsoever, did not name a specific region in their answer to the same question, but simply responded with ‘USA’ or ‘America’. The reason for such an answer could be that the question itself, ‘Where do you think the speaker is from?’, is very broad, too. Three people thought that the speaker was from the Northern USA, another three guessed he was from the Midwest, and only one participant gave a Southern state, Texas, as their answer. This could be a demonstration of the division on this matter among the participants of Experiment 1, but since most answers were too broad, there is no way of knowing the true extent of this division.

5.5 Limitations of the study

In order to generate more solid results, several things could have been done differently in terms of experimental design, speaker blurbs, and questionnaire design. More participants could have been recruited for the experiments to generate more substantial results. Furthermore, the prior information on the speaker that was included in Experiment 2 and 3 could have been given a more prominent position. If the blurbs were not placed on the same page as the instructions of the experiment, but on a separate page, they could have been more memorable, and therefore have more of an effect on the processing of the critical stimuli. This would also allow for room for additional elements to the blurbs, like a picture of the supposed speaker. Finally, the question ‘Where do you think the speaker is from?’ in the questionnaire could have been formulated in a way that could encourage the participants to answer with a specific region, not a whole country. If the question was ‘From which region/state do you think the speaker is from?’, people would be less likely to give a broad answer like ‘USA’, and more likely to really try to remember the characteristics of the speaker to guess a region of origin.

5.6 Future research directions

There are several directions that could be taken to gain more knowledge on the processing of -ing and -in’. A first option could be to alter the speaker blurbs in terms of description and presentation. The blurbs could, for instance, be more concise (‘This is Wade. He is a mechanic from Alabama.’), and accompanied with a picture of the supposed speaker. This would be interesting to try out, for the blurb could leave more of an impact on the participants when it is condensed. Shorter texts have a tendency to be more attractive (like slogans) and therefore skipped less easily. The blurb could even be read out loud by the speaker, and recorded. Such an endeavour could turn out to be beneficial because an oral introduction to the speaker consists of full sentences as opposed to the isolated words in the rest of the experiment, and hearing the speaker talk naturally first could evoke more convincing results in terms of the influence of speaker expectations. Moreover, the critical stimuli could be presented within sentences, rather than in isolation. While it is more difficult to measure RT of critical stimuli within full sentences, the fact that these words are produced in a more natural context could have a boosting effect on the RT. Campbell-Kibler's (2010) experiment, for instance, included speakers uttering full sentences, and generated clear results in terms of the perception of the speakers. Finally, instead of using only one speaker across different experiments, speakers that actually match the blurb could be recruited. This way, it could be investigated whether speaker expectations are somehow tied to how someone actually sounds rather than how we tell them that they may sound. This could lead to finding out whether people need perceptive proof that someone has a certain accent to form expectations about their use of the ING variable. In sum, it is clear that the subject of this study has a lot of potential to be researched further.

6. Conclusion

The aim of this study was to find out about the impact of prior speaker information on the processing of words containing the canonical variant -ing or the non-canonical variant -in’ in terms of speed and accuracy. Three experiments with the same lexical decision task but different (or no) speaker blurbs were performed to investigate this matter. It was expected that -ing would be processed faster and more accurately than -in’ across all three experiments (H1), due to its canonicality. Moreover, it was expected that -in’ would be processed faster and more accurately in Experiment 3 than it would in Experiment 1 and 2 (H2), since participants of Experiment 3 were told that the speaker was from Alabama, a region associated with the -in’ variant. The results showed that speaker information turned out to have little to no impact on the processing speed and accuracy of -ing and -in’, since the mean accuracy percentages and RTs were very similar across all three experiments. This can be interpreted as a demonstration of the canonicality advantage, as a form being canonical or not seems to make more of a difference than speaker expectations do.

In further research on this subject, the speaker information could be altered in terms of presentation and description, by providing less textual information on the speaker and more audio-visual information. Another possibility of additional research would be to include speakers that actually match the blurb to find out whether expectations might be more linked to the speaker’s actual pronunciation than to a blurb. As stated before, more things could be done to investigate the subject matter of this thesis further. Or, as we would expect Alabamians to say: ‘You could be doin’ a lot of things.’

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Appendices

Appendix I: Critical stimuli

ItemN	-ing trial	-in trial
C1	stealing	stealin
C2	crawling	crawlin
C3	itching	itchin
C4	nudging	nudgin
C5	smearing	smearin
C6	steering	steerin
C7	twitching	twitchin
C8	cooking	cookin
C9	hugging	huggin
C10	soaking	soakin
C11	tweaking	tweakin
C12	bumping	bumpin
C13	dreaming	dreamin
C14	leaping	leapin
C15	shoving	shovin
C16	stopping	stoppin
C17	weeping	weepin
C18	boasting	boastin
C19	draining	drainin
C20	mending	mendin
C21	snoozing	snoozin
C22	swirling	swirlin
C23	yielding	yieldin
C24	croaking	croakin
C25	jogging	joggin
C26	speaking	speakin
C27	paying	payin
C28	clapping	clappin

C29	dripping	drippin
C30	pasting	pastin
C31	sipping	sippin
C32	sweeping	sweepin
C33	chewing	chewin
C34	brushing	brushin
C35	drowning	drownin
C36	scanning	scannin
C37	spinning	spinnin
C38	swooning	swoonin
C39	blinking	blinkin
C40	docking	dockin
C41	knocking	knockin
C42	stacking	stackin
C43	sighing	sighin
C44	climbing	climbin
C45	dropping	droppin
C46	mopping	moppin
C47	swooping	swoopin
C48	growing	growin
C49	burning	burnin
C50	glaring	glarin
C51	mixing	mixin
C52	scowling	scowlin
C53	lagging	laggin
C54	teaching	teachin
C55	clicking	clickin
C56	faking	fakin
C57	picking	pickin
C58	thinking	thinkin
C59	jumping	jumpin
C60	napping	nappin
C61	linking	linkin

C62	spraying	sprayin
C63	blooming	bloomin
C64	drumming	drummin
C65	bribing	bribin
C66	delving	delvin
C67	plowing	plowin
C68	wasting	wastin
C69	jousting	joustin
C70	clogging	cloggin
C71	coping	copin
C72	carving	carvin
C73	burping	burpin
C74	bluffing	bluffin
C75	saving	savin
C76	skimming	skimmin
C77	launching	launchin
C78	bouncing	bouncin
C79	charring	charrin
C80	bragging	braggin

Appendix II: Filler stimuli

ItemN	Real word (R) / Nonword (N)	Word	Type
F1	R	corner	er
F2	R	easter	er
F3	R	sewer	er
F4	R	soccer	er
F5	R	archer	er
F6	R	tailor	er
F7	R	mayor	er
F8	R	suitor	er
F9	R	swimmer	er
F10	R	cleaner	er
F11	R	mother	er
F12	R	golfer	er
F13	R	leader	er
F14	R	winner	er
F15	R	skier	er
F16	R	actor	er
F17	R	department	ment
F18	R	figment	ment
F19	R	dorment	ment
F20	R	pigment	ment
F21	R	ailment	ment
F22	R	basement	ment
F23	R	parchment	ment
F24	R	catchment	ment
F25	R	pickle	mono
F26	R	judgement	ment
F27	R	movement	ment
F28	R	shipment	ment
F29	R	pavement	ment
F30	R	statement	ment

F31	R	placement	ment
F32	R	treatment	ment
F33	R	monk	mono
F34	R	skate	mono
F35	R	form	mono
F36	R	milk	mono
F37	R	raise	mono
F38	R	tart	mono
F39	R	wipe	mono
F40	R	snore	mono
F41	R	author	er
F42	R	juror	er
F43	R	leather	er
F44	R	victor	er
F45	R	donor	er
F46	R	river	er
F47	R	blunder	er
F48	R	brother	er
F49	R	comment	ment
F50	R	moment	ment
F51	R	torment	ment
F52	R	segment	ment
F53	R	garment	ment
F54	R	ointment	ment
F55	R	augment	ment
F56	R	clement	ment
F57	R	tuck	mono
F58	R	fly	mono
F59	R	throw	mono
F60	R	push	mono
F61	R	bag	mono
F62	R	sing	mono
F63	R	flight	mono

F64	R	blue	mono
F65	R	stymy	mono
F66	R	pupper	mono
F67	R	equal	mono
F68	R	throttle	mono
F69	R	tarnish	mono
F70	R	hurry	mono
F71	R	pity	mono
F72	R	tidy	mono
F73	R	giggle	mono
F74	R	boggle	mono
F75	R	heckle	mono
F76	R	cripple	mono
F77	R	limit	mono
F78	R	tumble	mono
F79	R	trumpet	mono
F80	R	level	mono
F81	R	lobby	mono
F82	R	burrow	mono
F83	R	empty	mono
F84	R	huddle	mono
F85	R	angle	mono
F86	R	cackle	mono
F87	R	foil	mono
F88	R	shimmy	mono
F89	R	valley	mono
F90	R	envy	mono
F91	R	levy	mono
F92	R	cobble	mono
F93	R	towel	mono
F94	R	fancy	mono
F95	R	bully	mono
F96	R	facet	mono

F97	R	swim	mono
F98	R	clean	mono
F99	R	scarf	mono
F100	R	golf	mono
F101	R	lead	mono
F102	R	win	mono
F103	R	ski	mono
F104	R	act	mono
F105	R	corn	mono
F106	R	east	mono
F107	R	sue	mono
F108	R	sock	mono
F109	R	arch	mono
F110	R	tail	mono
F111	R	may	mono
F112	R	suit	mono
F113	R	wrestle	mono
F114	R	busy	mono
F115	R	hassle	mono
F116	R	riddle	mono
F117	R	vary	mono
F118	R	fiddle	mono
F119	R	worry	mono
F120	R	argue	mono
F121	N	cleanint	ingNW
F122	N	breathint	ingNW
F123	N	fishint	ingNW
F124	N	sendink	ingNW
F125	N	plannint	ingNW
F126	N	kissint	ingNW
F127	N	touchint	ingNW
F128	N	changint	ingNW
F129	N	sayink	ingNW

F130	N	laughint	ingNW
F131	N	keepert	erNW
F132	N	jokerk	erNW
F133	N	bankert	erNW
F134	N	roverk	erNW
F135	N	oddmend	mentNW
F136	N	claimank	mentNW
F137	N	hutmenk	mentNW
F138	N	bodemenk	mentNW
F139	N	cooint	ingNW
F140	N	helpint	ingNW
F141	N	snubbink	ingNW
F142	N	coaxink	ingNW
F143	N	joinink	ingNW
F144	N	foolint	ingNW
F145	N	failink	ingNW
F146	N	guardint	ingNW
F147	N	greetind	ingNW
F148	N	votenk	ingNW
F149	N	ragind	ingNW
F150	N	rentimp	ingNW
F151	N	meltint	ingNW
F152	N	printind	ingNW
F153	N	fundint	ingNW
F154	N	spillimp	ingNW
F155	N	spoilint	ingNW
F156	N	pilint	ingNW
F157	N	bruisind	ingNW
F158	N	piercint	ingNW
F159	N	patchimp	ingNW
F160	N	urgimp	ingNW
F161	N	drivet	NW
F162	N	creepet	NW

F163	N	backerp	NW
F164	N	docturk	NW
F165	N	glazek	NW
F166	N	cypherk	NW
F167	N	panzerp	NW
F168	N	blazemp	NW
F169	N	zappert	NW
F170	N	buzzerp	NW
F171	N	quacket	NW
F172	N	knackemp	NW
F173	N	fizzet	NW
F174	N	quavet	NW
F175	N	supperk	NW
F176	N	powdet	NW
F177	N	butlep	NW
F178	N	pottelt	NW
F179	N	fullent	NW
F180	N	timbelt	NW
F181	N	tigrech	NW
F182	N	prowent	NW
F183	N	summinch	NW
F184	N	flewis	NW
F185	N	deepelt	NW
F186	N	dragolt	NW
F187	N	polohm	NW
F188	N	badgeb	NW
F189	N	suitef	NW
F190	N	vendose	NW
F191	N	pitak	NW
F192	N	lorest	NW
F193	N	bettulk	NW
F194	N	bundef	NW
F195	N	persit	NW

F196	N	bluestam	NW
F197	N	chursel	NW
F198	N	bruschel	NW
F199	N	glamant	NW
F200	N	ambuts	NW
F201	N	rabbisk	NW
F202	N	spidelk	NW
F203	N	vapif	NW
F204	N	crossund	NW
F205	N	mackremp	NW
F206	N	bridgom	NW
F207	N	sorbayn	NW
F208	N	rawbult	NW
F209	N	gheetim	NW
F210	N	wintuk	NW
F211	N	fightel	NW
F212	N	solix	NW
F213	N	thwoxit	NW
F214	N	snowast	NW
F215	N	spirenk	NW
F216	N	crayint	NW
F217	N	hundram	NW
F218	N	spannelm	NW
F219	N	plighka	NW
F220	N	tastol	NW
F221	N	scuppen	NW
F222	N	zittel	NW
F223	N	preseg	NW
F224	N	prinken	NW
F225	N	girdem	NW
F226	N	jummel	NW
F227	N	stipet	NW
F228	N	ordung	NW

F229	N	splinten	NW
F230	N	silep	NW
F231	N	bluxan	NW
F232	N	prisselk	NW
F233	N	ploufip	NW
F234	N	smertha	NW
F235	N	pintor	NW
F236	N	bandisp	NW
F237	N	stiy	NW
F238	N	luhd	NW
F239	N	nihldz	NW
F240	N	graek	NW
F241	N	glown	NW
F242	N	jhahm	NW
F243	N	tehjh	NW
F244	N	glay	NW
F245	N	traet	NW
F246	N	drahl	NW
F247	N	strown	NW
F248	N	spown	NW
F249	N	kaek	NW
F250	N	prihp	NW
F251	N	skawn	NW
F252	N	hhowk	NW
F253	N	klaw	NW
F254	N	feht	NW
F255	N	kehngk	NW
F256	N	waelf	NW
F257	N	striyn	NW
F258	N	faemp	NW
F259	N	kehks	NW
F260	N	slaak	NW
F261	N	cheyd	NW

F262	N	bihm	NW
F263	N	blund	NW
F264	N	chaz	NW
F265	N	draed	NW
F266	N	klow	NW
F267	N	leath	NW
F268	N	neyjh	NW
F269	N	attens	mentNW
F270	N	wisens	mentNW
F271	N	rodens	mentNW
F272	N	invemp	mentNW
F273	N	argemp	mentNW
F274	N	assenk	mentNW
F275	N	advemp	mentNW
F276	N	dop	NW
F277	N	liss	NW
F278	N	quib	NW
F279	N	moop	NW
F280	N	youn	NW
F281	N	swip	NW
F282	N	masp	NW
F283	N	coom	NW
F284	N	darp	NW
F285	N	hurp	NW
F286	N	kint	NW
F287	N	sedge	NW
F288	N	waske	NW
F289	N	vowp	NW
F290	N	tust	NW
F291	N	resk	NW
F292	N	colb	NW
F293	N	solm	NW
F294	N	pouk	NW

F295	N	foth	NW
F296	N	mouk	NW
F297	N	paink	NW
F298	N	tolk	NW
F299	N	frienk	NW
F300	N	playb	NW
F301	N	tabe	NW
F302	N	beeg	NW
F303	N	doorb	NW
F304	N	wort	NW
F305	N	plun	NW
F306	N	muts	NW
F307	N	shoon	NW
F308	N	broon	NW
F309	N	tral	NW
F310	N	spen	NW
F311	N	kyich	NW
F312	N	plaem	NW
F313	N	niyn	NW
F314	N	gowg	NW
F315	N	raol	NW
F316	N	lahdz	NW
F317	N	kleys	NW
F318	N	skihjh	NW
F319	N	traor	NW
F320	N	hheyv	NW

Appendix III: Speaker blurbs

Experiment 2:

The person speaking is called Andrew. He is 31 years old, and he was born and raised in the state of Connecticut. He has a master's degree in Architecture from Harvard, and currently works at a large architecture firm in his home state of Connecticut. He lives in a modern two-bedroom apartment with his girlfriend of seven years. Andrew's hobbies include reading, travelling, and sailing.

Experiment 3:

The personal speaking is called Wade. He is 31 years old, and he was born and raised in the state of Alabama. After graduating from high school, he went to work as a car mechanic at a local garage, where he still works today. He lives together with his wife and two daughters in a four-bedroom bungalow. Wade's hobbies include fishing, watching sports, and woodworking.