Perceptions. Of…Punctuation*!*

A study into the interpretation of punctuation by native and non-native speakers of English in WhatsApp

Ben Pleij

b.pleij@umail.leidenuniv.nl

Master: *Linguistics*

Track: *English Language and Linguistics*

Supervisor: D. Smakman

Second reader: M. Terkourafi

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i.   Abstract

Computer-Mediated-Communication is bereft of any intonation markers usually found in face-to-face conversations. As a result, how a sender meant to send out a message, versus how their addressee reads it sometimes fails to align. This can lead to uncooperative and confusing online communication. This paper set out to examine if (and what) effects different punctuation types have on the interpretation of meaning in WhatsApp communication, and whether one's age or native language influences the perception of these markers. Unlike previous studies conducted on this topic which focussed only on students, this study was conducted among 123 respondents from a wide variety of ages and countries. Through an online survey, participants were asked for their opinions and thoughts to different types of punctuation used in recurring but otherwise identical messages. Results indicated that different punctuation types elicit strong and differing views, based on what punctuation type is used, and that these types influence their feelings towards the message as well as to the personal state of their interlocutor. The most significant findings were found for ellipsis points and messages lacking any punctuation: ellipses can lead to very negative interpretations in respondents, and a lack of punctuation can lead to respondents feeling sidelined. Interpretations of certain punctuation types are influenced by a reader's age and native language. Using Yus' theory of a phatic internet and cyber literacy, this paper posits that the reason respondents assign these meanings to different types of punctuation is to avoid misunderstandings, form identities, and stay on good terms with people in a world in which most daily conversation happens online.

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1.   INTRODUCTION

1.1 Overview

The introduction of the internet, text messaging, and later worldwide adoption of apps have caused a rise in text-based communication. With the advent of smartphones and flat-rate tariffs for sending messages, communication through apps has become easier and has changed the way we communicate: messages have expanded from the abbreviation-heavy "textspeak" to longer sentences containing unabbreviated words and phrases and can even consist of animated GIFs and full-colour emoticons. The conversations we have through these digital mediums are referred to as Computer-Mediated-Communication. In the digital world, it is as important to understand the tone in which something is said as in the real world, as well as to have an agreement within CMC on what is meant between sender and receiver– a research area known as cyberpragmatics. One of the ways users negotiate intent and the interpretation of meaning in CMC is through punctuation. This paper will focus on the effects of punctuation on the interpretation of meaning in utterances, as well as how a user's age and native language might be a factor in this.

1.2   Problem statement

In order for communication to be successful, people use both linguistic and non-linguistic cues to indicate what they mean in both online and offline face-to-face (F2F) communication. In F2F interactions, both types can be employed and perceived to indicate what kind of message we wish to send out, and how we feel about each other and the content discussed. Examples of linguistic cues (besides words) are auditory markers such as tone of voice and intonation. Non-linguistic cues are body language, facial expression, gestures, eye contact, posture, etc. Both types of cues used to express oneself are absent in text-based digital mediums such as WhatsApp or Facebook, which could confuse the recipient of an electronic message and give rise to ambiguity and miscommunication. It is important for users to understand the message their counterparts mean to convey to avoid misinterpretations. Employing different strategies to convey tone and intent, such as through punctuation, can be a solution to this. These strategies can take on a discursive function and convey a thought or emotion, intent or tone (for instance, by using a period at the end of a sentence to signify something else besides closing a sentence). They add an additional "layer of activation to certain contextual assumptions" and, like hashtags on

Twitter, "guid[e] the reader's inferential processes" (Scott, 8). For this to happen though, users must have similar notions on what different cues (such as punctuation types) mean in certain contexts.

1.3   Purpose of paper

The aim of this paper is to investigate whether certain punctuation markers are now being understood to have additional uses and are used to indicate tone and additional pragmatic meaning in CMC. These markers[1] are the full stop (or period), three dots traditionally conveyed as an ellipsis (…)[2], and the exclamation mark. As a fourth marker, examples without punctuation will also be looked at. The paper will examine how people interpret these punctuation types across a wide range of internet users (of various ages, genders, and backgrounds). Of interest is then whether internet users interpret these types of punctuation differently, potentially causing misunderstandings and confusion. In this way, the study will contribute to a growing body of research related to cyberpragmatics and studies in (online) language use between different users.

1.4   Examples of relevance of study

In a non-academic context, members of the public (Maduri, 2018), linguists (McCulloch, 2015), and business media (Bindley, 2018) have caught on to punctuation cues being used to indicate intent: in Bindley's article, interviewee Hannah Wagle recounts her own panicking at one point, thinking (erroneously) that she had lost her job when her boss had unexpectedly used a period: her boss responded with *"It's fine."* to a text in which Hannah said she was sick and would work from home that day. Hannah, reading a tone and passive-aggressiveness when there was not any, misread her boss' intent and expected to get fired. Hannah would have been more comfortable with an exclamation mark which her boss had used often in the past to create, in her words, "a safer space". Additionally, consider the following post made on Twitter on 29th August 2018 by Dom Maduri:

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[1] Unless otherwise stated in the text, the terms *cues* and *markers* will be used interchangeably to refer to the three methods of punctuation under review in this paper.

[2] Although ellipsis has other definitions (which will be elaborated upon in Chapter 2.2), throughout the rest of this paper the terms *ellipsis, ellipsis point(s)* or *ellipses* will all be taken to refer to the use of three periods placed after one another.

Figure 1: Maduri's tweet concerning the use of multiple periods (ellipsis) at the end of an utterance.

The post concerns the user's indignation of whom he sees as 'older people' using multiple periods at the end of a message. The author describes a perceived mismatch between what he believes to be 'older' adults' use of periods, and his own use of them. The post attracted online activity quickly: the tweet received in excess of 111,000 retweets, 439,000 likes and more than 1,900 responses in the two weeks after being posted, with the Twitter account *@penguinbydom* itself having 330 followers on October 7, 2018.

Previous research into the use of another type of punctuation, the exclamation mark, showed that users found it lightened the tone of messages, but also make the sender appear less serious. This happened more so in men than in women (Posner, 2018). Likewise, the full stop is not used often: this type of punctuation was only found in "transmission-final position" in 29% of texts and 35% of instant messages (Ling & Baron, 2007). Therefore, punctuation (or the lack of it) seems to plays a role in day-to-day life in how non-linguists approach messages and their content.

1.5   Research questions, hypothesis, and significance of study

The following research questions were outlined for this study:

1) *What are the effects of punctuation (in periods, ellipsis points and exclamation marks) and its absence on the interpretation of meaning in WhatsApp?*
2) *What is the effect of user age in the perception of these?*

3) *Is there a difference in this perception between native and non-native speakers of English?*

Based on the existing literature, this paper's hypothesis is that in order to avoid the recipient of a digital message ascribing a different tone than what is meant by the sender, users have taken existing punctuation and developed new ways of using it to convey tone and intent, for instance through the use of periods and ellipses. Knowledge and usage of this new way of writing is preferred foremost by Millennials and members of Generation Z (people under 26) whereas older generations only casually pick up on it or not at all.

This study will not investigate whether or not 'older' people or people speaking different languages actually use an ellipsis or other types of punctuation in 'weird places' (to quote the example by Maduri). Instead, it will look at whether the use of these types of punctuation is seen as weird or remarkable by different groups of people, of which age and native language are variables. If periods and other markers are used differently now than they were before (possibly due to a difference in user age or mother tongue), this is of special significance to linguists studying CMC language use. This knowledge could shed light on how different groups assert their identities by adhering to or disassociating themselves from said use, as well as how this might fluctuate depending on the level of formality, place of usage, and to whom the message is directed. Knowledge of these differences will allow better research to be undertaken and might provide further insight into the continuing evolution of online communication practiced by users comfortable with the internet's workings.

The study was conducted through an online survey in which participants were shown sets of simulated WhatsApp conversations employing these different punctuation styles. They were then asked to judge whether these manners of writing were socially appropriate. The next chapter will concern the definition and literature concerning CMC as well as some existing theories of (cyber)pragmatics to contextualise how people read and interpret messages offline and online. Traditional uses of the different punctuation types will also be discussed. The subsequent two chapters will outline the study undertaken and discuss the results of the analysis in relation to the theories. The paper will close with a summary of the work done as well as the implications and options for further research.

2.   BACKGROUND – LITERATURE REVIEW

This chapter will deal with three topics, all important to understanding the role of the current research in the field of internet language. It will discuss CMC and some of its characteristics; outline the definition and function of the various types of punctuation under review and, lastly, detail some pragmatic theories which describe how interlocutors choose, interpret and make sense of their partner's language use.

2.1 CMC

CMC stands for Computer-Mediated-Communication, a term that has been around for over fifty years (Elmgren, 2018). The term is used to refer to all language use that occurs in an online context or "any interaction that occurs through information and communication technologies (ICT)" (Adams et al., 2). CMC covers "a range of platforms used for conversing online, including email, *listservs*, chat, or instant messaging" (Baron, 11)[3]. It has been described as Interactive Written Discourse (Ferrara et al., 1991) and as "exhibiting much of the interactivity and informality that is often found in speech" (Zappavigna, 127). In the past, the field has been looked at as a purely written discourse, while more recent research approaches CMC as writing whose structures closely resemble the structures of speech in F2F communication, and state that it should be treated as a new form of discourse (Adams et al., 2). It has been shown that certain discourse features in CMC can signal alternative use or non-serious intent (Herring, 1999): this paper is interested in uncovering which alternative uses respondents notice.

    2.1.1   Characteristics. Several linguists have offered classifications and further definitions of CMC: work by Crystal (2001, referring to it then as *Netspeak*[4]) and Herring's Faceted Classification Scheme (2007) were important in providing a shared terminology regarding CMC, and provided the basis for much of what its characteristics are. A selection of these characteristics (also dubbed "textisms" by Houghton, Upadhyay, & Klin, 2018) are:

- A distinction between synchronous and asynchronous communication (so-called 'immediate' versus 'delayed' electronic messaging, such as the difference between instant messaging and chat compared to e-mail or message boards/forums);

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[3] Baron (2008) states that with the advent of 'smart' mobile devices, the term 'computer' in CMC is outdated, and instead opts for EMC – electronically mediated communication. For the sake of clarity, the still-dominant term CMC will be used throughout this paper. Given the paper's research topic, the term will naturally also include communication conducted through (apps on) smartphones.
[4] He now prefers the term 'internet linguistics', considering the term CMC to be "too broad" (Elmgren, 8).

- Clippings (for instance using *prob* for probably), cases of homophony (for instance in *2day* for today), or vowel deletions such as *msg* for message (Adams et al, 9-10);
- The use of emoticons and acronyms;
- Employing a "hybrid combination of written and spoken features" (Androutsopoulos, 420) while also displaying its very own properties (Crystal, 2011);
- A reduced usage of orthography which does away with most punctuation and avoids capital letters; writing patterns which resemble the writer's speech and thoughts such as "ellipses to show incompleteness, dashes to mark a change in direction of thought, and commas to denote pauses; and a greater overall informality" (Crystal, 2011 in Elmgren, 9).

Finally, the lack of opening and closing sequences, and a "continuous dipping in and out of conversation" have come to exemplify CMC, especially in WhatsApp, the largest platform of online communication today (Dayter, 185). Due to the vast and fragmented nature of the internet (with different niches and pages for different interests), many particular linguistic styles can be identified in CMC (Solomon n.d., cited in Elmgren 2018).

   2.1.2   Learning CMC, and the relevance of user age. As mentioned, CMC has been characterised in the past as a discourse positioned between regular written communication and spoken language. Using CMC well requires practice to learn and master: conversational tasks have been recorded as taking four times as long to complete compared to F2F interactions (Graham, 9). Walther (1992) formulated the Social Information Processing (SIP) model to account for this difficulty of use; the theory focussed on CMC to analyse how psychological presence influences conversations. It describes how CMC's "limited bandwidth", which does not provide room for any interactional cues found in face-to-face communication, filters out all the non-verbal channels: thus, it conveys less information in text-based conversations. This can lead to communication which feels less personal and produces negative evaluations of others (Derks et al, 2007), but users attempt to compensate for these shortcomings by reinstating such information in different ways, such as emoticons and (as this paper will put forth) punctuation.

   Carlson & Zmud stated that in order to be understood, to 'read' and understand others in CMC, gaining technical knowledge for the technology at hand and an awareness of its rules is crucial (Adams et al, 2012). They explained this with their CET (channel expansion theory), which states that if users familiarise themselves with the online community at hand, the medium (app/platform) they are using, the topics they are discussing, as well as the organisational context, then they will eventually become adept at understanding CMC's

idiosyncratic discourse features. For this to work, they must have the proper motivation and have a "prolonged experience" with it (Adams et. al, 5). He or she will then gain competence and knowledge of the specialised rules of that medium. This is what Yus (2017) refers to as cyber-literacy, which will be looked at in more detail shortly. Teenagers are said to look at their phones 150 times per day (Mayyasi, 2016) and have a preference for communicating online instead of face-to-face (Morris, 2018). Therefore, the theories mentioned above are important because they suggest that the more experience one has with this digital medium, the more adept one becomes at it. This could suggest a discrepancy in research results dealing with people of different ages in the forthcoming study.

2.2 Punctuation

Punctuation has been referred to as "the traffic signals of language" (Truss, 7) and serves a definite function in writing, both online and offline. How wide-reaching the use and interpretation of punctuation is has been researched previously, but such studies restricted themselves only to SMS text messages and used only college students or undergraduate students as participants (Ling & Baron 2007, and Houghton, Upadhyay, & Klin, 2018). Before conducting a study into the effects of punctuation on the interpretation of meaning in WhatsApp, the most popular instant messaging app used today (Snelling, 2018), it is first necessary to describe their function in day-to-day written communication, as well as some recent developments.

   2.2.1   Full stop. A full stop (or period, as it will be called onwards) is traditionally used to mark the end of a declarative or imperative sentence (such as "It's raining" or "Close the window") (Kolln and Gray, 278). It can however also be used to announce discontent (Crair, 2013, and Marsden, 2018). In CMC it is often replaced by a line break, more closely mimicking the way people speak, rather than the way they write (as mentioned earlier in this chapter, the resemblance to spoken discourse in CMC's writing features is what sets it apart from regular writing). In a study by Ling & Baron (2007), 'transmission-final' punctuation was only used in 29% of texts and 35% of instant messages. Finally, markers such as a period are known to function well as a cue for indicating sarcasm (or another alternative meaning) when paired with hyperbolic statements ("fantastic weather") (Kunneman, 502). Messages that end with a period are seen as less sincere than those which do not (Houghton, Upadhyay, & Klin, 2018).

2.2.2   Ellipsis. An ellipsis can refer to any sentence part which has been simply left out (Kolln and Gray, 2010): it can sometimes signal an understanding of sorts –a pause– between writer and reader ("pay attention, I've left this part out"). The word ellipsis can also refer specifically to punctuation use, however. In this paper, the use of ellipsis refers to three[5] sequential periods, also known as an ellipsis point (…). In this manner, the ellipsis point is used "to indicate the omission of one or more words within a [...] sentence" (ibid, 276).

While the most well-known use of the ellipsis point is to refer to something which has been omitted or to signal a pause for effect (University of Oxford Style Guide, 2016), research has also shown that when ellipsis occurs in CMC, the message may be interpreted as incomplete and the content of that message may be seen as inaccurate or untruthful (Graham et al., 32). Hancock (2004), as well as Walther and D'Addario (2001) even found that ellipses were more often used successfully as a carrier of irony and sarcasm in messages than emoticons. Ellipses have also been indicated as allowing a conversation to continue rather than signalling its end, as is done with a full stop (Crair, 2013).

2.2.3   Exclamation mark. An exclamation mark (AmE: exclamation point) is usually employed to mark the end of an exclamatory sentence, or it is used in sentences that call for added emotions (Kolln and Gray, 2010). The use of an exclamation mark is also sometimes said to lighten the tone of messages, but it can conversely also make an e-mail or its author appear less serious (Posner, 2018). In a study conducted through Morning Consult (ibid), men were asked to look at an e-mail containing an exclamation mark at the end of a message from a co-worker who was said to be female. 49% of the men polled said they found the use of an exclamation mark in that message very professional and 'standard'. However, in instances when the e-mail was said to be written by a man, results dropped to 36% of the men considering it professional use. A study on more than 3,000 messages posted to electronic discussion lists related to library and information science education revealed that 73% of all exclamation marks in online correspondence were made by females and 27% by males, and that they function as "markers of friendly interaction" (Waseleski, 1020), or to indicate that the sender "really means this" (ibid, 1014). Other non-academic media outlets have noted a change in the use of the exclamation mark, namely a hefty

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[5] The decision was made to focus on ellipsis as represented by three periods as three is the most common. Also including ellipses made up of two, four or more period would have added more variables to the list. Moreover, a separate study would have been needed to ascertain whether participants viewed two and four periods to mean the same as three, as this author is not aware of any previous study of its kind having been conducted.

increase in places where it would before not be used (Castles, 2015). These studies, together with the article by Bindley (2018), seem to suggest that woman use exclamation marks more often than men to convey friendliness. While this paper will not look at the differences in punctuation interpretation between genders, these cases support the view that different groups of people interpret exclamation punctuation types differently.

   2.2.4 No punctuation. Little research has been conducted on the interpretation or use of messages lacking punctuation. Still, even a lack of punctuation can be thought to convey meaning in certain situations: when the utterance is phrased as a question, an absence of punctuation has been said to change the statement to a "disingenuous deadpan snark" (McCulloch, 2015).

2.3 Pragmatics

In order to communicate successfully, both in speech and in writing, interlocutors rely heavily on the use of implicit information to convey meaning (Sabbagh 1999, cited in Cheang & Pell, 2008). How this implicit information is conveyed and interpreted by speakers is studied in a branch of linguistics called pragmatics. It is useful for this paper to look briefly at pragmatic theories as that field is concerned with the study of meaning, the relationship between meaning and context (Chapman, 2011), and the interpretation of utterances (Scott, 2015). Therefore, pragmatics can answer the question of how internet users interpret messages in a certain way, and how this strengthens their communication. More importantly, pragmatic theories can provide an understanding of how punctuation plays a role in this process.

   2.3.1 Grice's cooperative principle. One way to interpret non-literal language in communication is through Grice's cooperative principle. Paul Grice (1975) focussed on different versions (or 'levels') of meaning. These he labelled 'What is said' and 'What is implicated', where 'What is said' can be taken to refer to the literal meaning. He wanted to show how "the differences between literal meaning and what speakers can convey in context were not random and unpredictable, but rather can be explained in relation to some general principles of language use" (Chapman, 70). Grice came up with a theory of how people are able to understand each other in conversation by outlining several maxims. Any

of these can be violated or flouted[6], causing the hearer to look for an underlying and possibly opposite interpretation to the literal sentence meaning. The most important of these is to 'Be cooperative', a maxim that can be divided into smaller maxims:

Maxims of Quantity:

- Make your contribution as informative as is required (for the current purposes of the exchange).
- Do not make your contribution more informative than is required.

Maxims of Quality – Your contribution should be true (Supermaxim[7]):

- Do not say what you believe to be false.
- Do not say that for which you lack adequate evidence/information.

Maxim of Relation:

- Be relevant.

Maxims of Manner – Simply be clear (Supermaxim):

- Avoid obscurity of expression.
- Avoid ambiguity.
- Be brief.
- Be orderly.   (Adapted from Chapman, 74–75.)

Grice's maxims describe the different assumptions people have when they talk to each other. According to the cooperative principle (written with face-to-face communication in mind), the speaker wants to make themselves understood to the listener using the exact number of words necessary (Grice, 1975), and be truthful while saying it. When using sarcasm, irony or other non-literal language, this means that even when what the speaker says is not exactly what he means, the listener should not have to struggle to understand the speaker (Kellner et al, 2017). When spoken to, audience members appreciate an adherence to this principle and expect that they will not have to put in more effort to find the meaning of the message.

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[6] A maxim is *violated* when a speaker quietly fails to fulfil the maxim (for instance by lying). It is *flouted* when the failure to fulfil the maxim is blatant, for instance, when conveying humour, irony or ambiguity (Grice, 1975). There are two more options one can take: opting out and clashing (Graham et al, 2016). In informal, personal communication though, these strategies are employed less often than the first two, and they are mentioned less in research literature.

[7] This is a rule that takes precedence over the other maxims (Graham et al, 2016).

Conversational Implicatures. In order to understand what a speaker is trying to say, the addressee will have to both figure out what is being communicated explicitly (called an explicature) and what is communicated implicitly (referred to as an implicature) (Scott, 2015, and Chapman, 2011). An implicature deals with how we convey messages indirectly and without it being too obvious (Chapman, 2011). When listeners receive an indication that our interlocutor is saying something other than what they mean, for instance by flouting one of Grice's maxims, we then start to look for meanings beyond what was literally said: we can then be said to be drawing a 'conversational implicature' (Meyerhoff, 97). Confusion arises when the receiver of the message thinks something else is being (explicitly or) implicitly communicated than what the sender intended to say. For instance, when a friend says that it is "Such a lovely day out!" on a day in which it is pouring, the default assumption is that they are not deliberately being uncooperative or unclear as they are our friend. Therefore, they must want us to interpret their saying in a way that goes beyond the literal sentence meaning. Alternatively, say you have a friend who has been thinking about quitting her job because she hates it there, and she has been complaining about it on several occasions. If you were to ask her how her day was and she would reply by saying she "Had another fantastic day at the office!", then this would appear to go against the Maxim of Quality, as it would seem to contradict earlier statements. However, according to Grice, a hearer would prefer to believe that their interlocutor was being truthful. Therefore, given past experiences and the relationship they would have towards one another, it is more reasonable for the hearer to assume that the friend is only *appearing* to lie in order to say something other than what she means.

This principle can be transposed to digital communication as well. In the "dipping" environment of CMC (in which people dip in and out of conversation as they negotiate multiple chat screens at the same time, Dayter 2018), punctuation such as periods or ellipses are hardly ever required at the end of every sentence. Therefore, including them would not be adhering to the Maxim of Relation ('Be relevant'). This is because it would take up more time on the side of the reader to process (who is not gaining any information by the 'regular' use of the ellipsis and period), and more time on the side of the writer to put it down (violating the Maxim of Manner – 'Be Brief'). Therefore, readers start looking for alternative interpretations as to why their interlocutor put those signs there. This supposed incongruence between parties is what this thesis sets out to investigate in the next chapter, and possibly relate to age and native language.

2.4 Cyberpragmatics and the notion of a phatic internet

Within pragmatics, a new field has developed specifically geared to CMC. It is called cyberpragmatics, first coined in 2001 to refer to a pragmatics study of internet-mediated communication (Yus, 2011). The field concerns itself with how users bridge the contextual gap between what they intend to say and how they translate this information through devices such as mobile phones or computers, as well as how that online information is then produced and interpreted.

2.4.1   Phatic internet and its role within CMC.

A punctuation's relation to the literal meaning of the text preceding it (the lexical meaning, as opposed to a pragmatic meaning), can lead to misunderstandings or feelings of insecurity on behalf of the addressee on how to interpret the intent of the sender. But why should this be important?

Yus (2017) writes in his paper that one main feature in WhatsApp communication (and other instant messaging applications) is its employment by users to maintain social relationships. WhatsApp use has led to a "feeling of increased social presence and the feeling of a narrowed gap between the physical and the virtual" (Yus, 2017 in Dayter, 185). Yus notes WhatsApp's popularity as being part of a larger shift towards a phatic internet. The notion 'phatic internet' stands for an internet in which users spend an increasing amount of time sending what would appear to be useless content to one another (examples of which are telling jokes, sending pictures, GIFs, random status updates, or videos). Yus describes phatic communication as "massive exchanges of messages with little informational relevance but enormous impact on users' feelings of connectivity and sociability [...]" (2017, 66). Phatic internet is centred on feelings and the strengthening or maintaining familial bonds or friendships, in lieu of actually conveying relevant information. Yus theorises that internet users who are offline friends and wish to compensate for their lack of physical closeness engage in highly phatic communication as it increases solidarity, and contributes to a feeling of kinship. As he (2017) and Miller (2008) argue, maintaining a relationship through texting has become more important than actually sending relevant information; 'killing time' with someone is more important to the user than only contributing immediately paramount or relevant information. As such, this type of communicating contributes to our own social standing and the way we are viewed by others: the quantity of our communication (time spent talking to friends online) is not necessarily less important than the quality of the topics discussed.

2.5 Conclusion

Grice's maxims and other pragmatic theories strive to explain how language is interpreted between interactants, but operate on the condition that the speaker intends to be truthful and helpful; both recognise each other's needs and compensate accordingly to make sure they are understood correctly. Confusion arises where there is no mutual agreement on when to use certain textual markers which indicate this. This can, for instance, arise through cultural differences between speakers of two different countries. It is also possible that these differences come from age or (in the case of CMC) through a varying level of technological aptitude. In computer-mediated-communication, perception of a message hinges very much on the type of language, writing style, and graphical markers used, as well as whether both speakers use these in the same way. The present study will attempt to expand upon the available knowledge in the field of how punctuation is used. First though, this paper will outline the methodology of the study conducted in the next chapter.

3. METHODOLOGY

3.1 Research Overview

Previous research into language use in CMC (Carey, 1980, Androutsopoulos, 2006, and Kunneman, 2014) has shown that people have various strategies to convey mood and pragmatic tone. Some of these tactics have existed for a long time, such as lengthening of words (vocal spelling) or the use of capital letters (Carey, 1980). The present study will investigate whether a period, ellipsis point, exclamation mark, or a lack of any punctuation has an effect on the interpretation of meaning in WhatsApp, and if there is a difference in this interpretation between people of different ages and between native vs. non-native speakers of English. The study was undertaken using an online survey amongst participants who were native and non-native speakers[8], all of different age groups, genders, and backgrounds. The survey consisted of simulated images made to look like WhatsApp conversations dubbed "social situations", which the respondents were asked to judge and then answer other questions on.

3.2 Variables

The simulated conversations contained identical messages each employing one of the four punctuation types under review. These were:

  I.   The use of the period (.)
 II.   The use of the ellipsis point (…)
III.   The usage of the exclamation mark (!)
 IV.   No punctuation

These 'screenshots' were all displayed independently of each other, in a random order, on separate pages.

3.3 Participants

3.3.1 Age. 123 people participated in the study by successfully submitting a questionnaire (those who participated but did not complete the process were not

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[8] For the remainder of this paper we will refer solely to 'native' and 'non-native' speakers, with which is meant someone who is a native speaker of the English language.

registered). Participants ranged in age from 14 to 55 (*Mean = 26.9[9], Median = 26, S.D. = 9.4*).
These participants were divided into two age groups: group 1 ran from age 14 to 25 years
old and the second group ran from ages 26 through 55 years:

Table 3.1 Distribution of the respondents into different age groups

		Frequency	Percent
Group	1	61	49.6
	2	62	50,4
	Total	123	100.0
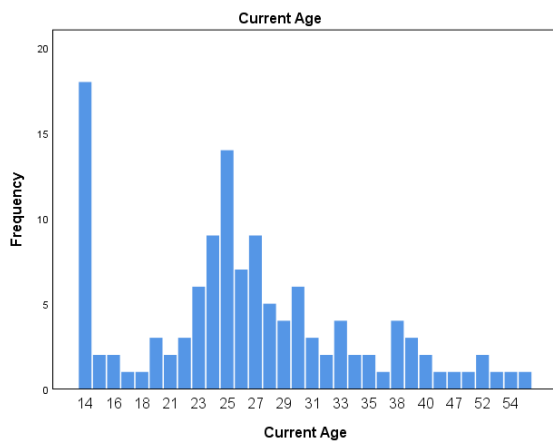
Figure 2 Distribution of ages of all individual respondents. A bar chart is shown here for ease of reading: a full breakdown can be found in the appendices (§7.3).

The division between these age groups was made because 26 is the median, making that age
a useful cut-off point; there are an almost equal number of responses before it as after it (61
to 62). This ensured an equal balance of distribution in later tests. Also, 26 can be seen as
the age at which most people (in the Western world) are done with studying and have
started working life: the transition from more informal language in one's younger student
years to a more 'professional attitude' later in life might provide some interesting
differences.

   3.3.2 Gender. Although no further analyses were conducted in this paper on any
gender differences in punctuation interpretation, gender identities were recorded: 73
respondents were women, 44 were men, and six would rather not say or did not identify as
either gender.

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[9] Unless specifically explained otherwise, all numbers (excluding p-values and some tables in the appendix) are
rounded to one decimal in this paper.

Table 3.2 Gender distribution of survey respondents

		Frequency	Percent
Valid	Female	73	59.3
	Male	44	35.8
	Neither/I prefer not to say	6	4.9
	Total	123	100.0

3.3.3 Native speakers. People sampled were both native speakers (46 in total) and non-native speakers of English (77 in total) – considering those numbers, non-native speakers make up almost two-thirds of total respondents:

Table 3.3 Distribution of 'nativeness[10]' of survey respondents

		Frequency	Percent
Valid	No	77	62.6
	Yes	46	37.4
	Total	123	100.0

As such, an imbalance exists which favours answers of non-native speakers. This was compensated for though in the statistical tests in the next chapter.

All in all, the groups and subgroups of respondents can be presented as follows:

Table 3.4 Breakdown of the size of the different groups of respondents taking part in the survey.

Age group	Native Speaker	N
1	No	42
	Yes	19
	Total	**61**
2	No	35
	Yes	27
	Total	**62**
Total	No	77
	Yes	46
	Total	**123**

3.4 Representation of population

Entry requirements were deliberately not strict considering the wide range of users today using a device capable of engaging in CMC. As such, the sample obtained is a mix of people with various backgrounds from which recognisable patterns can nevertheless be drawn. A balance was sought between the number of native speakers and non-native speakers, to see if they use punctuation differently from one another. The same aim existed for the sizes of both age groups.

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[10] For reasons of brevity, we will refer throughout this paper to whether or not someone is a native speaker of English with the term "nativeness".

3.5 Criteria

As mentioned above, as there are so many different groups of people today capable of engaging in CMC, there were no excluding criteria for partaking in the study.

3.6. How participants were found

Participants were obtained through various channels. Several students of the MA Linguistics programme of Leiden University were asked to send the questionnaire to people they knew who did not have a particular affiliation with English-language studies. Calls were put out on the 'MA Linguistics Leiden' and 'Leiden Research Participants' groups on Facebook. Younger non-native speakers were sourced by contacting teachers of English in Dutch schools: these then distributed the test to their students. In addition, members of English-language theatre groups (*LET, AATG*) were contacted: these groups consisted of a mixed group of adult native-speaker expats and non-native speakers, all of various nationalities. Finally, native and non-native speakers of English were contacted through Textwerk, a translation agency in Amsterdam. Participants were given an incentive to partake by having a chance to win a gift certificate.

3.7. Instructions & procedure

Respondents were given a brief explanation of the context of every conversation presented[11], followed by the simulated screenshot. They were then asked to do two things: first, to grade their interlocutor's responses and judge to what extent they believed the responses were socially appropriate on a scale of 1–5 (1 being very inappropriate – 5 being extremely appropriate). Second, they were asked to answer two open questions: what they interpreted the current message to be conveying, and how the current response made them feel. This approach analysed two things: the first figure would indicate whether or not they thought the different punctuation types were socially appropriate in that context, while the other answers obtained would make an analysis possible of what phatic role they felt the punctuation type played in how the answer was interpreted.

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[11] The original survey, including all the screenshots presented to respondents, has been archived for future reference; the link to which can be found in the appendices (§7.1).

3.8. Material

Participants were shown chat screens created using a website-based WhatsApp chat generator: screenshots were made to look as if they originated from the app. This way, conversations would feel familiar to the participants and less artificial; the informal, social aspect of the app was retained. The conversations consisted of various responses to a friend, boss or family member. Some were created specifically for this study; others were modelled off real-life situations such as those mentioned in Bindley (2018) and the earlier Twitter post by Dom Maduri.

In order to combat the so-called 'order effect' (having the respondents enter a lot of information for the first examples, but becoming bored and less forthcoming as the study progresses), all possible variants were presented in a random order, so that participants would not see all four punctuation instances of one social situation after another. In another attempt to combat fatigue, participants were asked to limit their answers for the open questions to ten words per open question. Finally, as there were five social situations and four different ways of punctuation per situation (20 unique responses in total), three two-minute breaks were created after every five questions to ensure participants' continued focus. These breaks consisted of a short YouTube video on a humorous, non-linguistic subject (participants were free to take a longer time off if they wanted to). A test subject (whose results were not included in this study) completed the entire test (including scheduled video breaks) in around 25 minutes.

The test was conducted from 30 October through 21 November 2018 through Google Forms. Its results will be discussed in the next chapter.

4. RESULTS

The purpose of the study was to determine if there were differences in the interpretation of various punctuation types. This was done by means of an online survey. Results of the survey will be presented in two parts to answer the three research questions posed earlier. Part one (§4.1) will answer research question 1 and will look at respondents' personal opinions on the different punctuation types. Part two (§4.2) will answer research questions 2 and 3 by detailing the results of subgroup analyses, which took place by means of a T-test and a two-way ANOVA.

4.1   Answering research question 1 – Respondent opinions

4.1.1   Survey question #1 – Social appropriateness figures. As outlined earlier, respondents were shown 20 WhatsApp conversations in total. For each of these, the first question asked was "Based on spelling, phrasing and tone, how socially appropriate do you find the response in this situation?" Respondents could pick between 1 and 5 as an answer (1 being very inappropriate – 5 being extremely appropriate). The statistics of what answers they gave are as follows:

Table 4.1 Average figures per punctuation type given to survey question 1 (N=123). More exhaustive tables containing figures per social situation can be found in the appendices (§7.4).

	Mean	Std. Deviation
PERIOD AVERAGE	3.6	.6
ELLIPSIS AVERAGE	2.6	.7
EXCLAMATION AVERAGE	4.2	.5
NONE AVERAGE	3.4	.6

As is apparent, responses featuring ellipses were deemed the least appropriate (average of 2.6) while utterances employing exclamation marks were deemed the most appropriate (average figure of 4.2). Messages using no punctuation were considered on average less appropriate than when a period was used (a 3.4 average versus a 3.6). However, both can still be said to be considered appropriate, having received an average figure higher than 3.0 (the neutral middle). These average figures will be further broken down per user groups (age and native language) in §4.2 where research questions 2 and 3 are discussed.

The figures in table 4.1 above outline how respondents generally viewed the social appropriateness of different punctuation types, but they are too constricting for a clear analysis of how each type of punctuation is interpreted: a respondent might give a message with an ellipsis a mark of 2 (inappropriate) for one reason, but another respondent might

give it the same number for a very different reason. Respondents were therefore also asked two open questions to allow for sentiment analysis. The next paragraph will discuss how these were obtained and coded. In the subsequent paragraph, these results will be shown and analysed.

4.1.2   Relevance of open questions, and coding the answers. For every social situation presented, the open questions were:

1. *What is your interpretation of the message and mood of this answer?*

2. *How does the current response make you feel?*

After the survey closed, the answers to both open questions were coded (assigned categories). There were 123 participants answering two open questions per all 20 social situations presented. This would have resulted in (123 * 20 * 2 =) 4,920 open answers to code. However, tallying up the total answers for each category resulted in more than that, as respondents' answers often contained sentiments related to multiple categories. In total, 5,453 distinct answers were coded: 2,813 for open question 1 (respondents' interpretations), and 2,640 for open question 2 (respondents' feelings). In total, 17 different kinds of sentiments were identified and were then given category numbers. These categories are presented in numerical order on the following page in table 4.2. Percentages and figures (n) for all categories are presented in two different columns (OQ1 and OQ2), each marked in yellow. On page 30, a brief explanation of how to read the table will be given.

Table 4.2 All 17 categories identified in the comments for open question (OQ) 1 and 2 (ordered numerically).

category #	characteristic (type of comment)	OQ1		OQ2		example responses
		%	n	%	n	
	Total answers:	2,813		2,640		
1	SARCASTIC/CYNICAL	3.7%	105	0.5%	14	"Hint of sarcasm"; "maybe a bit cynical"
2	FAKE/INSINCERE/IMPLAUSIBLE RESPONSE	12.6%	355	5.8%	152	"Negative"; "Lied to"; "Disappointed"; "Bit too much, fake"; "Passive aggressive", "…sceptical [*sic*] or annoyed"
3	UNCERTAINTY/CONFUSION	4.8%	136	8.4%	221	"How do they feel about it?"; "it left me questioning what's wrong"; "I have to rethink the message, because it is not clear."
4	"UNFINISHED BUSINESS"	1.6%	46	0.6%	17	"Like I should be expecting a further message"; "Waiting for something more"
5	ANSWER INSUFFICIENT	0.6%	16	0.6%	16	"Fine, could be better"; "not too bad, but it could sound a bit more enthusiastic after my last message"
6	UNINTERESTED/BUSY	10.6%	297	4.2%	110	"Rushed"; "Indifferent"; "Unenthusiastic"; "Tired"; "Feel ignored".
7	(TOO) FORMAL/HIGH FORMALITY	5.9%	167	1.9%	49	"Cold"; "Distant"; "very to the point"; "Emotionless"; "Businesslike"
8	ANXIOUSNESS	0.4%	10	4.3%	114	"Nervous"; "Uncomfortable"; "Worried"
9	UNHAPPINESS/SADNESS	0.6%	17	6.2%	163	"Sad"; "Not appreciated"; "Did not make me feel good."; "Guilty"
10	BAD/UNKIND RESPONSE	0.4%	10	1.9%	50	"It is not the good way to answer"; "Miserable"; "Stupid"; "Awful"
11	POSITIVE	32.3%	909	31.4%	829	"sweet and supporting; "Solid end to the convo"; "appropriate"; "Enthusiastic"
12	NEUTRAL	8.2%	231	20.0%	529	"Fine"; "Neutral"; "Okay"; "just normal"
13	WEIRD LANGUAGE USE	2.7%	76	2.8%	74	"The communication is not right so it's weird to read"; "seems a strange reply", "An awkward response to my enthusiasm."
14	SPECIFICALLY MENTIONING PUNCTUATION	6.9%	193	2.9%	76	"Full stop rids 'hahahaha' of some of its playfulness."; ""!" gives support, positive feedback"
15	RELATED TO RELATIONSHIPS/ AGE/SOCIAL DISTANCE	3.1%	88	1.5%	40	"This person just doesn't know how to text."; "Sound[s] like my mum"; "This is how my friends would reply"
16	VARIOUS/OTHER	3.5%	99	1.8%	47	"Matches tone"; "Its a joke"; "Long answer"
17	NOT RELEVANT/ UNCOOPERATIVE	2.0%	58	5.3%	139	*[comments left blank]*; "?";"Answered this"

Under the column labelled "characteristic", the name for the different categories can be read – this describes what the sentiments are about. The columns next to it, marked in yellow, each contain results for one of the open questions posed: the figures in column *OQ1* (Open Question 1) indicate which categories of answers were given when respondents were asked to gauge the *intentions* of interlocutors, while the data in column *OQ2* indicate which types of answers they gave when asked how those social situations made them *feel*. These numbers are the total numbers of comments to all type of punctuation put together. Some representative sample comments are presented in the next column. These comments are from answers to both open questions.

This table already establishes some things, such as that category 2-type comments (the fake/insincere category) are within the top three of most expressed interpretations for open question 1 (with 12.6% of all comments), and that respondents used comments indicating positivity (category 11) most often in both open questions (with 32.3% and 31.4% of all comments, respectively). However, it does not specify *which* punctuation types solicited certain sentiments. A more detailed analysis of these figures will yield better insights. This analysis will take place in the next two paragraphs, where the results of both open questions (survey questions #2 and #3) are discussed more thoroughly.

4.1.3   Survey question #2 – Respondents' interpretation of answers. After being shown a social situation, respondents were asked the first open question (about their interpretation of their interlocutor's answer). That question returned various types of answers, which were then numbered and counted. Below are the total figures. Table 4.3 shows how often certain comments were given per punctuation type. For instance, it tells us that category 11 (positivity) received a total of 909 comments in this survey question (open question #1), and that 460 of those 909 comments were given in social situations in which exclamation marks were used (please refer back to table 4.2 for a complete overview of what each category number stands for). Another example is that category 8 ('Anxiousness') received only 10 comments in total and that it received 0 comments in social situations using periods or exclamation marks:

Table 4.3 Overall view of comments received for open question 1 (per category, for all punctuation types).

Category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	**Total**
PERIOD	27	70	10	2	8	90	89	0	4	0	216	65	12	35	22	23	15	688
ELLIPSIS	54	218	87	36	3	47	22	8	8	6	62	16	45	78	30	16	14	750
EXCLAMATION	9	28	6	3	2	21	21	0	2	2	460	33	9	22	3	29	13	663
NONE	15	39	33	5	3	139	35	2	3	2	171	117	10	58	33	31	16	712
Total	105	355	136	46	16	297	167	10	17	10	909	231	76	193	88	99	58	**2,813**

This paragraph will look at the table's top five highest-scoring categories for each punctuation type, to discuss what respondents thought their interlocutor was actually saying, or what message they felt interlocutors were trying to convey. The results do not express respondents' personal feelings about said punctuation or how the messages affected them: these areas will be covered for open question 2 in §4.1.4. The following analyses will be on the total figures observed in the table above. For a complete distribution of comments received per social situation, please refer to the full tables in the appendices (§7.5).

Period

The question of how respondents interpreted the messages received 688 comments, with the top five categories being as follows. Note that in all tables in §4.1.3 and §4.1.4 category numbers written in bold (such as category 7 below) denote that this category received the highest score for this open question here out of all punctuation types.

Table 4.4 The top five results for punctuation employing periods (N_{total}=688). These categories represent 77,0% of all comments left (n=530).

Rank	Frequency (n)	Category number	Percentage of total
1	216	11 (Positive)	31.4%
2	90	6 (Uninterested/Busy)	13.1%
3	89	**7 (High formality)**	12.9%
4	70	2 (Fake/Insincere)	10.2%
5	65	12 (Neutral)	9.4%

Respondents interpreted social situations in which periods were used as mostly positive ones (category 11) or they read these to mean that their interlocutor was not interested (category 6). However, category 7 comments were produced in almost equal number. This indicates that respondents considered messages with a period to be businesslike, shallow, or distant ("A bit coldhearted"; "No emotion in the message"; "Not as personal is it could be"). This was the highest number for category 7 of all punctuation types for open question 1.

Ellipsis

In total, social situations using this punctuation type received 750 comments. There were four response categories here receiving top scores. The top five categories are as follows:

Table 4.5 The top five results for punctuation employing ellipses (N_{total}=750). These categories represent 66.5% of all comments left (n=499).

Rank	Frequency (n)	Category number	Percentage of total
1	218	**2 (Fake/Insincere)**	29.0%
2	87	**3 (Uncertainty/Confusion)**	11.6%
3	78	**14 (Punctuation)**	10.4%
4	62	11 (Positive)	8.3%
5	54	**1 (Sarcasm)**	7.2%

Messages using an ellipsis were most often interpreted by respondents as being either an untruthful, implausible or an insincere response (category 2). It received the most comments to open question 1 for this punctuation type. Respondents left comments such as: "They are being very passive aggressive"; "[They're] Not very happy, maybe dishonest"; "they are not genuine"; "He says it's fine, but actually he is not amused". They also interpreted messages with ellipses as being vague and hard to read: category 3 received more mentions for open question 1 here than in any other punctuation type, with comments such as "What do they mean? Did I do something?"; "ambiguous, somewhere between neutral and annoyed"; "Not that enthusiastic, as if she is in doubt", or "Hesitation". Category 14 ranks as the third category of this top five and is reserved for respondents' comments explicitly mentioning punctuation. Its figures for this question (in both numbers and total percentage) were also higher than anywhere else in the test. Some sample comments were "Strange that she uses the dots"; "Unprofessional! Elipsis [*sic*] indicate annoyance [*sic*] […]"; "Three dots makes it less convincing"; "Using the dot-dot-dot implies that something is wrong or that the person is in trouble". Sometimes respondents interpreted ellipses to signal a sarcastic or cynical response (category 1). This becomes apparent through comments such as "Sarcastic / rude"; "sarcasm, she did not really like it"; "Because of the ellipsis I would interpret it as sarcastic or reluctant". The ellipsis received the highest number of category 1 comments of any punctuation type for this open question, although it must be noted that the majority of those comments mostly occurred in one social situation (see table 7.8).

Exclamation

On messages with exclamation marks, 663 comments were left in total. The table for this punctuation type has six ranks instead of five, as category 16 (and 17) by definition contain unusable comments: these are ignored and all categories after them will move up. The results of note show that respondents interpreted messages using exclamation marks overwhelmingly positively, compared to messages containing other punctuation types:

Table 4.6 The top six results for punctuation employing exclamation marks (N_{total}=663). These categories represent 92.6% (n=614) of all comments left (including percentages for category 16 and the shared sixth place for category 6 and 7).

Rank	Frequency (n)	Category number	Percentage of total
1	460	**11 (Positive)**	69.4%
2	33	12 (Neutral)	5.0%
3	29	16 (Other)	4.4%
4	28	2 (Fake/Insincere)	4.2%
5	22	14 (Punctuation)	3.3%
6	21	6 (Uninterested/Busy) & 7 (High formality)	both 3.2%

Nowhere else in the test did category 11 receive as many comments for this open question. Comments were left such as "She means it"; "Positive message: caring and kind"; "Energetic and participating in the conversation"; "Positive, reassuring, sincere". Also, nowhere was the difference between the highest and the second-highest category in the top five as great (424 comments and 64.4% between category 11 and 12). As category 11 comments comprise such a large percentage of the total number of comments typed, all other categories contain only relatively few comments by comparison and were thus not analysed.

No punctuation

712 total comments were given by respondents interpreting the messages without punctuation. The top five categories were as follows. Respondents most often interpreted answers given without any punctuation as being a positive or a good answer (category 11):

Table 4.7 The top five results for messages without any punctuation (N_{total}=712). These categories represent 73.5% of all comments left (n=524).

Rank	Frequency (n)	Category number	Percentage of total
1	171	11 (Positive)	24.0%
2	139	**6 (Uninterested/Busy)**	19.5%
3	117	**12 (Neutral)**	16.4%
4	58	14 (Punctuation)	8.1%
5	39	2 (Fake/Insincere)	5.5%

However, a close second is category 6, indicating that respondents also interpreted their interlocutor to be uninterested, indifferent or busy. This is revealed through comments such

as "not very exited [*sic*], uninterested"; "Low enthusiasm"; "it sounds like a robot, not like mum"; "Like she typed it very fast. Is she distracted? Annoyed?"; "Like she did not care"; "She wants to stop the conversa[t]ion", and "Rushed but approving". This category received the most comments for this punctuation type of all punctuation types. Number three on the list (category 12) indicates that respondents felt okay or neutral about the lack of punctuation, having no special feelings on the matter: "Fine, nothing special"; "It is just a normal conversation; "Seems like a natural response". This is also the highest number for this punctuation type in the test for this open question.

In conclusion, attention must briefly be paid to comments left for category 15 (a category reserved for comments made concerning readers' assumptions about their interlocutor's age or technical aptitude, based on punctuation used). It does not appear in table 4.7 above due to it having fewer mentions than the first five categories. However, from a sociolinguistic point of view, the comments left are relevant with regards to the literature discussion in the Conclusion chapter. This punctuation type received 33 mentions for this category (4.6% of total comments), the highest for this open question. Sample comments left were "With older people, lack of emotion in text is forgivable"; "some parents just type this way, could be interpreted [that] she is upset"; "Typical old parent response"; "Mum is not so good with WhatsApp"; "This is how my friends would reply". We will return to these in §5.5.

This concludes the results for open question 1, dealing with respondents' interpretations of messages received. The results for the second open question, dealing with how the different punctuation types made respondents feel, will now be discussed.

4.1.4 Survey question #3 – Respondents' feelings. The second open question, given immediately after each first one, asked respondents how the interlocutor's response made them feel. Respondents to this question gave slightly fewer comments than for the previous question. The table below again shows per punctuation type how many comments were given of a certain category. For instance, it tells us that category 3 ('Confusion') received a total of 221 comments in this survey question (open question #2) and that 116 of those comments were given in social situations using ellipsis points:

Table 4.8 Overall view of comments received per category for all punctuation types for open question 2.

Category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	**Total**
PERIOD	5	40	43	5	6	36	27	14	36	4	197	166	8	13	18	10	32	660
ELLIPSIS	5	65	116	10	3	20	6	77	89	34	54	66	43	29	11	13	36	677
EXCLAMATION	3	9	22	1	4	9	7	10	10	2	410	85	13	6	2	9	33	635
NONE	1	38	40	1	3	45	9	13	28	10	168	212	10	28	9	15	38	668
Total	14	152	221	17	16	110	49	114	163	50	829	529	74	76	40	47	139	**2,640**

The following summaries will discuss which emotions and feelings the respondents had after reading the differently punctuated messages for the five (or six) highest-scoring categories.

Period

For the question of how messages made respondents feel, 660 comments were received for responses with a period. For this punctuation type, no categories reached top scores. Respondents felt mostly positive about the comments containing periods or had neutral feelings for them:

Table 4.9 The top five results for punctuation employing periods (N_{total}=668). These categories represent 78.4% of all comments left (n=518; including results for the shared fifth place).

Rank	Frequency (n)	Category number	Percentage of total
1	197	11 (Positive)	28.6%
2	166	12 (Neutral)	25.2%
3	43	3 (Uncertainty/Confusion)	6.5%
4	40	2 (Fake/Insincere)	6.0%
5	36	6 (Uninterested/Busy) & 9 (Unhappiness/Sadness)	both 5.5%

Generally, results for the period were not significant and did not contain any surprising scores for any of the individual categories. These results will thus not be analysed further.

With reference to the theory of phatic internet, however, we must again briefly look at category 15 comments left. The period received 18 comments (2.7% of total) for this category: the highest for open question 2. It would not have been otherwise discussed due to its low results, but the sample comments paint an interesting picture with respect to user expectations and judgements of their interlocutors. Respondents said of messages with periods that "Not really anything [is] wrong with it, but [it] reads as though it's written by someone new to messaging apps (or a parent!)"; "Somewhat underwhelming phrasing, but fits parent text patterns."; "Okay, it's mum so she doesn't know how to convey socially appropriate messages through text anyway"; "Like my parents always punctuate their text messages"; "Feels like a typical mom reply, from a mom who isn't great at text messaging".

These comments and their implications will further be analysed in the Conclusions chapter (§5.5).

Ellipsis

A total of 677 comments were received for messages with this punctuation type. Once again, four response categories here received top scores for this open question, all relating to neutral or negative feelings:

Table 4.10 The top five results for punctuation employing ellipses (N_{total}=677). These categories represent 61.0% of all comments left (n=413).

Rank	Frequency (n)	Category number	Percentage of total
1	116	**3 (Uncertainty/Confusion)**	17.1%
2	89	**9 (Unhappiness/Sadness)**	13.1%
3	77	**8 (Anxiousness)**	11.4%
4	66	12 (Neutral)	9.7%
5	65	**2 (Fake/Insincere)**	9.6%

Respondents most of the time felt confused or curious by comments employing ellipsis points, or these made them feel frustrated or insecure (category 3). This is apparent through sample comments such as "Curious. What didn't they say?"; "A bit doubtful, maybe I should call her to clarify things"; "I am left with misdirected feelings"; "Confused". The comments received for this category were the highest of all punctuation types for this open question. The second-most-often conveyed feelings were those of sadness, unhappiness, or feeling misunderstood (category 9). Respondents said "I feel sad"; "This person thinks I'm the scum of the earth"; "pressured, guilty"; "It makes me feel unrespected". This type of punctuation also received the most comments related to this category. Category 8 comments were also more often received for ellipsis punctuation than with any other punctuation type. Sample responses were "Concerned that I may have misstepped"; "Full of anxiety"; "Uneasy"; "Uncomfortable, guilty". Of note, lastly, was that respondents noted feelings of annoyance, disappointment or angriness (category 2) with the use of the ellipsis, saying they felt "bad, angry, disappointed"; "annoyed" or "aggravated". This was the highest percentage for this category out of all punctuation types for this question.

It should also be noted that here is the only instance (out of *both* open questions for all punctuation types) where positive feelings (category 11) are not in the top five list: with n=54 (7.9% of the total, table 4.8), that category would rank as number six here.

Exclamation

635 comments were received for this punctuation type, in the following order (top six only). Unlike with ellipsis punctuation, messages containing exclamation marks received the *most* comments related to category 11:

Table 4.11 *The top six results for punctuation employing exclamation marks (N_{total}=635). These six (!) categories represent 91.8% of all comments left (n=583; including category 17 results in calculations and the shared place for categories 8 and 9).*

Rank	Frequency (n)	Category number	Percentage of total
1	410	**11 (Positive)**	64.6%
2	85	12 (Neutral)	13.4%
3	33	17 (Not Relevant)	5.2%
4	22	3 (Uncertainty/Confusion)	3.5%
5	13	13 (Weird language use)	2.0%
6	10	8 (Anxiousness) & 9 (Unhappiness/Sadness)	both 1.6%

Respondents felt very confident and positive about such messages, saying "[I feel] happy, accomplished, thankful"; "Happy and loved"; "That all is well". This was the highest number of comments this category received for any punctuation type in this second open question. Once again, there was a large difference between the number one category and its runner-up: there were 325 comments (51.2%) between category 11 and 12. All other subsequent categories have comparatively low figures, and are less useful for analysis: they were again omitted.

No punctuation

Respondents wrote down 668 comments in response to how they felt about messages containing no punctuation. The distribution of these results are as follows:

Table 4.12 *The top five results for messages without any punctuation (N_{total}=668). These categories represent 80.9% of all comments left (n=541; including category 17 results).*

Rank	Frequency (n)	Category number	Percentage of total
1	212	**12 (Neutral)**	31.7%
2	168	11 (Positive)	25.1%
3	45	**6 (Uninterested/Busy)**	6.7%
4	40	3 (Uncertainty/Confusion)	6.0%
5	38	2 (Fake/Insincere) & 17 (Not Relevant)	both 5.7%

Here, the "neutral" category received more comments for messages without punctuation than for any other punctuation type, with answers such as "No feeling"; "I Guess fine"; "Neutral". In fact, this was the only time that category 12 comments overtook category 11 comments in either open question – in other words, the only time users felt more 'neutral'

about the messages they were asked to grade than anything else. Apart from these sentiments, users also to a high extent reported feeling ignored when reading messages without punctuation, or they felt messages received were very abrupt (category 6). They posted responses such as "My boss is busy"; "it's still okay, even though it feels as if she doesn't take time for me"; "She doesn't care"; "The person shows little interest"; "[I feel t]hat she didn't really look [at my message]". This category received the most mentions for this punctuation type out of all types.

These two paragraphs give a clear overview of all the feelings and impressions respondents had when presented with these punctuation types. These analyses, however, treated all respondents as members of one group. The next paragraph will conclude the Results chapter by answering the second and third research question with a look at how different groups of respondents felt about different types of punctuation.

4.2   Answering research questions 2 & 3 – Subgroup analyses

This paper has examined the ways in which respondents interpret punctuation types by viewing all respondents as one group. However, it also set out to examine in its second and third research question whether there is an effect that age and being a native speaker play in how respondents interpret punctuation. A two-way ANOVA (Univariate Analysis of Variance or *unianova*) was performed on the first 'social appropriateness' question of the survey (discussed in §4.1.1) to obtain these figures. A T-test was also run to determine the statistical significance of the group results. Both will be discussed in the following paragraphs.

4.2.1   Statistical significance of group results. Before undertaking the

ANOVA test, it was prudent to see whether all results were statistically significant. An Independent Samples T-test was conducted to gauge this significance. Below are all p-values obtained for the researched variables (age, nativeness) per punctuation type (full results can be found in §7.7 of the appendices):

Table 4.13 P-value results of Independent Samples t-tests. Bold emphasis added for statistically significant findings. Because of the usually small size of these figures, results were not rounded/shortened here.

	Period	Ellipsis	Exclamation	None
Age	.299	**.038**	.738	.586
Nativeness	.190	.403	.672	**.007**

Two of these t-tests returned statistically significant p-values at the 0.03 and 0.007 level (once for age, once for nativeness). This also means that the other statistics mentioned

cannot be said with a 95% certainty to be not the result of chance. For each following punctuation type, full ANOVA tables can be found in the appendices (§7.6).

4.2.2   Group opinions on period use. Given in the following tables are ANOVA results for respondents' marks of social appropriateness on situations containing punctuation types, in this case, periods. Figures are arranged per subgroup looked at (age group and nativeness). The figure below it graphically illustrates these findings:

Table 4.14 Breakdown (descriptive statistics) of average statistics for period punctuation by groups.[12]

Age group	Native Speaker	Mean	Std. Deviation
1	No	3.66	.67
	Yes	3.76	.65
	Total	3.69	.66
2	No	3.47	.63
	Yes	3.70	.58
	Total	3.57	.61
Total	No	3.57	.66
	Yes	3.73	.60
	Total	3.63	.64
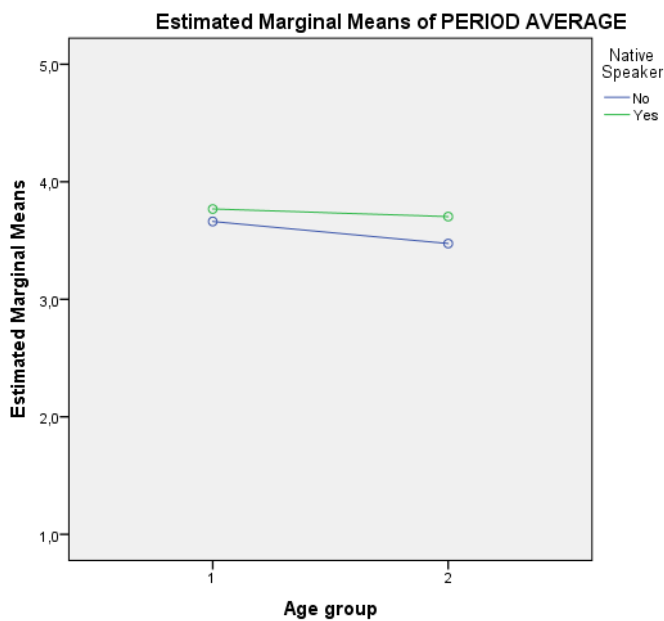
Figure 3 Graphical representation of ANOVA results for messages employing periods.

With average figures between 3.47 and 3.76, all groups can be said to find the usage of the period appropriate (higher than the neutral middle). Differences between groups are apparent here: these are not statistically significant according to the t-test however, and will not be discussed further.

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[12] Due to the high number of answers (123) and the relatively small range (1-5), ANOVA results are rounded to two decimals instead of one, to maximise efficiency in interpreting the results.

4.2.3 Group opinions on ellipsis use. The same test was performed on opinions on ellipsis use. The data per variable, noticeably lower than above, are outlined in the table below, supported again by a following graphical representation and a summary:

Table 4.15 Breakdown (descriptive statistics) of average statistics for ellipsis punctuation by groups.

Age group	Native Speaker	Mean	Std. Deviation
1	No	2.59	.79
	Yes	2.34	.46
	Total	2.51	.71
2	No	2.84	.84
	Yes	2.76	.75
	Total	2.80	.80
Total	No	2.70	.82
	Yes	2.59	.67
	Total	2.66	.77
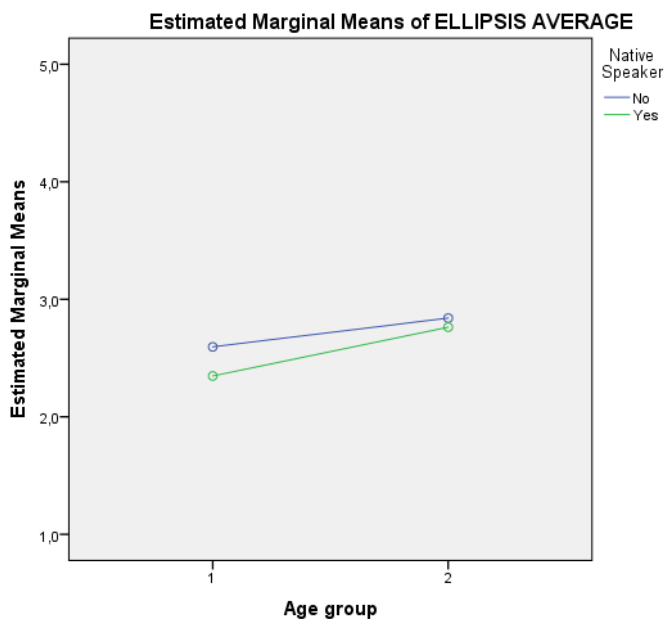
Figure 4 Graphical representation of ANOVA results for messages employing ellipses.

All groups consider ellipsis use socially inappropriate, with a total average score of 2.66. Younger respondents are more critical (less happy) about the use of ellipses than older speakers (an average 2.51 average vs. 2.80). This pattern occurs in both native and non-native speakers. However, native speakers on average find ellipsis use less socially appropriate than non-native speakers (it must be noted that nativeness results were not statistically significant).

The difference in averages grades for age groups are the largest in ellipsis punctuation than anywhere else: a 0.288 difference between age group 1 (2.51) and age group 2 (2.80). These results have a statistical significance at the 0.03 level as pointed out by the t-test. This means it can be assumed that the figures obtained for this group are not merely the result of chance and are indicative of a pattern.

4.2.3   **Group opinions on exclamation use.** Messages with exclamation marks were

generally met by high marks from respondents, as evidenced in the table and figure below.

All respondents have roughly the same (positive) feelings regarding exclamation use: with a

total average of 4.23, they all find the use of an exclamation mark to be more than socially

appropriate:

Table 4.16 Breakdown (descriptive statistics) of average statistics for exclamation punctuation by groups.

Age group	Native Speaker	Mean	Std. Deviation
1	No	4.21	.64
	Yes	4.33	.58
	Total	4.24	.62
2	No	4.21	.52
	Yes	4.20	.63
	Total	4.21	.57
Total	No	4.21	.59
	Yes	4.26	.61
	Total	4.23	.59
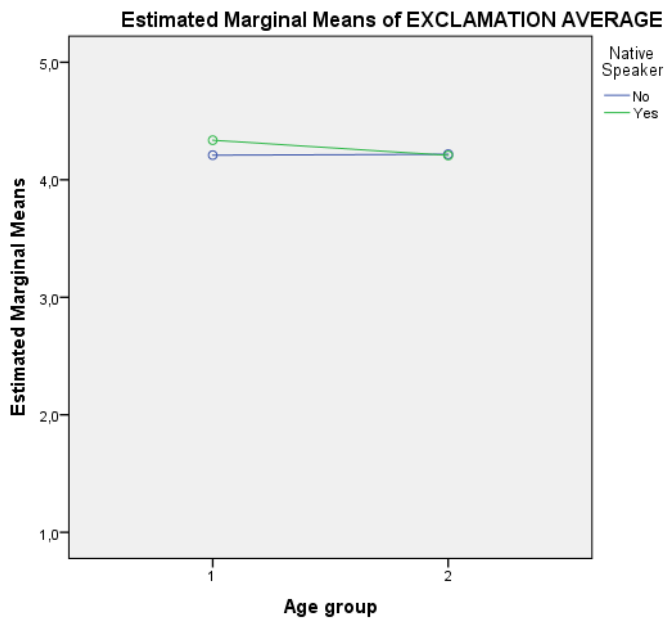
Figure 5 Graphical representation of ANOVA results for messages employing exclamation marks.

The average figures for both age groups (4.24 and 4.21 = a 0.03 difference) and the averages

for both nativeness groups (4.21 vs. 4.26 = a 0.04 difference) are the smallest for this

punctuation type than for any other. This support the views on exclamation marks raised in

§4.1.3 and §4.1.4 that respondents of all types largely agree on how to interpret the

exclamation mark. These views cannot be confirmed outright though, as no statistically

significant results were found through the t-test for this punctuation type.

4.2.5   **Group opinions on a lack of punctuation use.** After the previous highs and lows on exclamation and ellipsis punctuation, the last results (for comments without punctuation) are closer to that of period punctuation. with results in table 4.16 being once again close to the neutral middle (3.0):

Table 4.17 Breakdown (descriptive statistics) of average statistics for no punctuation by groups.

Age group	Native Speaker	Mean	Std. Deviation
1	No	3.37	.61
	Yes	3.69	.53
	Total	3.47	.60
2	No	3.22	.72
	Yes	3.63	.81
	Total	3.40	.78
Total	No	3.30	.66
	Yes	3.66	.70
	Total	3.44	.69
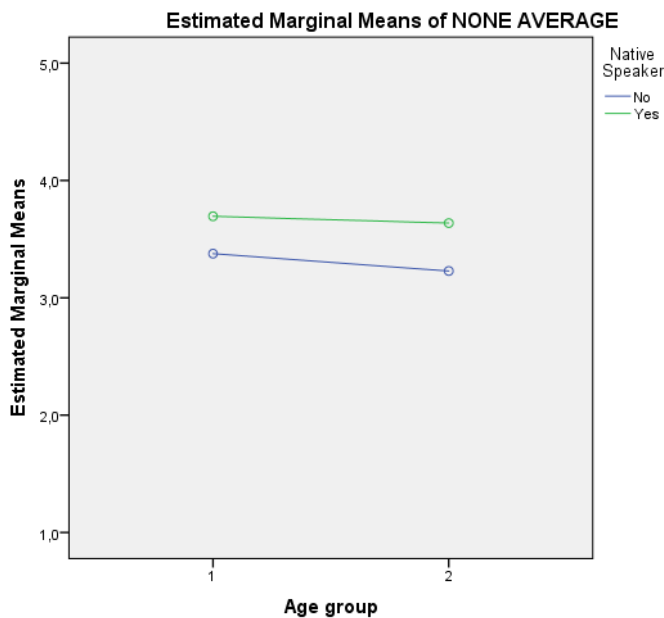
Figure 6 Graphical representation of ANOVA results for messages without punctuation.

All groups consider messages lacking punctuation to be somewhat appropriate, with even the lowest average figure (given by non-native older people) being a 3.22. However, native speakers do consider a lack of punctuation more appropriate than non-native speakers (an average 3.66 for all native speakers vs. an average 3.30 for all non-native speakers). In fact, the difference of 0.36 is the highest difference between language groups out of all punctuation type averages (for both age groups combined). These average answers from the language groups have a statistical significance at the 0.007 level as produced by the t-test. This again means it can strongly be assumed with 95% certainty that the figures obtained for this group are not merely the result of chance and are indicative of a pattern.

Summarising then, the different group opinions to punctuation types can be presented as follows:

Table 4.18 The conclusions of the ANOVA test. Statistically significant findings are highlighted in bold. Differences were deemed negligible when the average difference between groups was less than 0.1.

	Period	*Ellipsis*	*Exclamation*	*No punctuation*
Age	Younger people are more appreciative of a period than older people are.	**Younger people consider ellipses less appropriate than older people**	Differences negligible	Very slight difference between younger and older speakers: differences negligible
Nativeness	Native speakers are more appreciative of a period than non-native speakers are.	Native speakers consider ellipses less appropriate than non-native speakers	Differences negligible	**Non-native speakers find this less appropriate than native speakers**

The following final chapter will summarise these results, connect them to the existing research, will suggest implications on what to do with this knowledge, as well as give suggestions for further research.

5. CONCLUSION

5.1 Introduction

The goal of the present study was to ascertain what the effects were of different types of punctuation on the interpretation of meaning in WhatsApp messages. The paper furthermore set out to find whether there were differences in user perceptions of these punctuation types based on factors such as age and nativeness. Native and non-native speakers of all ages were presented with identical messages to give their opinion on, with messages differing each time only in the type of punctuation used.

5.2 Summary of important findings

Based on the results obtained earlier (table 4.1), it can be concluded that messages with exclamation marks are consistently rated as more socially appropriate (and therefore more positively) than other punctuation types. The same messages, written with ellipsis points, were consistently ranked the lowest. Between those two, messages with no punctuation were less appreciated than messages with periods. Furthermore, based on the ANOVA test and respondents' answers on the open questions, other prominent features discovered are:

Periods were interpreted by respondents as positive types of punctuation to use (table 4.4), but these also made respondents consider these answers passive, ambivalent or curt. More than elsewhere, respondents read answers with a period as implying a coldness, distance or formality between them and their interlocutor.

Concerning ellipsis points, respondents more often than elsewhere interpreted messages with this type of punctuation as fake or untruthful, and they also found these messages the most confusing and hard to interpret (table 4.5). They also specifically noticed this type of punctuation more often than in other types of punctuation, possibly because of its perceived vague nature. Although a small figure, respondents also interpreted messages with ellipsis points as being more sarcastic than other punctuation types. In terms of feelings, respondents felt the most confused, sad or anxious after reading messages with ellipses (table 4.10), as well as more annoyed, disappointed or negative after reading these than elsewhere. Younger people were found to be more critical (less happy) of answers containing ellipses than older people (figure 4): the numerical difference between their opinions was the largest for this punctuation type. One explanation of this could be that

ellipses confuse younger people more than older people, as the punctuation type represents a variable for which too many interpretations are possible, which older people simply consider less.

Messages with exclamation marks were overwhelmingly interpreted positively, indicating a clear agreement among most respondents on the interpretation of these messages (table 4.6). In addition, messages with exclamation marks most often made respondents feel positive or reaffirmed (table 4.11). While its results were not statistically significant, the ANOVA test supports this notion by showing that both types of speakers and age groups agree highly on the social appropriateness of exclamation marks (figure 5).

This paper discovered interesting findings with regards to messages without any punctuation. While respondents are generally okay with messages without punctuation, there was a bigger disagreement on its social appropriateness between the two groups of language speakers here than elsewhere: the punctuation type was considered by non-native speakers to be less appropriate to use than by native speakers (figure 6). While responses without punctuation were for a large part interpreted as conveying a positive message (table 4.7), an almost equally large group of respondents (more often than in other punctuation types) interpreted messages lacking punctuation to signal hurriedness, tiredness, ambivalence or lack of investment in the conversation on the part of their interlocutor. Moreover, in terms of emotions, messages without any punctuation made respondents feel neutral more often than with other punctuation types (table 4.12), suggesting they thought it was the most neutral type of punctuation out of the four tested. These messages also scored higher on respondent feelings of indifference or curtness than anywhere else: this means that respondents did not care for their interlocutor's responses when it did not contain punctuation. It also indicates that those messages made respondents feel as if they were being sidelined or ignored more than anywhere else. In essence, this study points out that not using punctuation also has a distinct discourse function to respondents. Lastly, this punctuation type was also most often singled out by respondents who attached this writing to another person's age, their relationship to them (such as parents), or their interlocutor's technical aptitude (such experiences with WhatsApp), as evident by the category 15 comments specifically mentioned in the above chapter.

5.3 Response to the research questions

RQ1: What are the effects of punctuation (in periods, ellipsis points and exclamation marks) and its absence on the interpretation of meaning in WhatsApp?

Punctuation can influence audience interpretation in a variety of ways. Different types of punctuation can completely change the way a message is interpreted. Punctuation can, for example, confuse, convince, or frustrate a reader, and it can lead them to completely disregard a message or view it as insincere when it would (with another punctuation type) be considered truthful and honest. There are also distinct effects between punctuation types at how users read the state of their interlocutor.

RQ2: What is the effect of user age in the perception of these?

ANOVA results indicate that user age affects the interpretation of punctuation in different ways, depending on which punctuation type is looked at. Sometimes younger people consider a type of punctuation more appropriate than older people do, sometimes this is reversed, and for other types, it makes no difference. Age group results for the use of ellipsis punctuation were statistically significant in showing that younger speakers find this type of punctuation more inappropriate than older speakers do.

RQ3: Is there a difference in this perception between native and non-native speakers of English?

Similarly, nativeness also plays a role in how readers interpret a type of punctuation, and differences in interpretation do occur: native speakers sometimes consider certain types of punctuation more appropriate than other ones. Results for 'nativeness groups' were statistically significant for responses in which no punctuation was used, showing that non-native speakers consider no punctuation less appropriate than native speakers.

5.4 Hypothesis validation

We originally hypothesised that CMC users had taken existing punctuation and developed new ways of using it to convey tone and intent. This was proven correct for ellipsis punctuation as well as for messages lacking punctuation: statistically significant results indicated actual differences here in interpretation averages of social appropriateness. This means respondents have ascribed new ways of using the punctuation types, and consider them to convey a specific tone and intent not previously known. Statistical significances for periods or exclamation marks did not materialise. The second part of the hypothesis posited that Millennials and members of Generation Z (age group 1) notice and use punctuation in

this new way the most, whereas older generations (age group 2) only casually pick up on it or not at all. While research questions 2 and 3 have been answered and show that there are differences in how different age groups interpret punctuation, enough statistical data is lacking on whether older people only casually pick up on that or not at all.

5.5 Comparison with other research

5.5.1 Punctuation. Previous research looking at the use and interpretation of punctuation restricted itself (among other things) to college students or undergraduates as participants (Ling & Baron 2007, and Houghton, Upadhyay & Klin, 2018). This study has been able to present results generated by a more diverse part of the population, including high-school students and people in their 30s, 40s, and 50s. These results present new ways in which punctuation is used, and sometimes reaffirm earlier findings: in certain cases, respondents saw the period as a sign of discontent, confirming earlier research (Crair, 2013 and Marsden, 2018). Other previous studies focussed on feelings of sarcasm occurring with period use (Kunneman, 2014). Contrary to this earlier research, results from this study show that ellipses are also interpreted as carriers of sarcasm; more so than periods. Consistent with earlier research (Graham et al, 2016), results illustrate that messages with ellipses are seen as incomplete or untruthful, and this paper has shown that the punctuation type is also understood to bring about very negative emotions in its readers, such as unhappiness or anxiousness. Results on exclamation marks were consistent with previous studies; what is striking in this study is the uniformity in the agreement for it between respondents. Finally, as earlier research on the interpretation of messages without punctuation is scarce, this punctuation type is where the most information was learned. Respondents did not in large numbers consider unpunctuated responses to have a "deadpan snark" (McCulloch, 2015), but they did think these responses were either very neutral, or insincere and curt. Besides disingenuousness, respondents have also been found to attach far more ideas about the state and mindset of their interlocutor than previously known.

5.5.2   Pragmatics: Grice's cooperative principle. The cooperative principle, which outlines hearer expectations when conversing, can also inform and explain survey respondent answers: respondents seemed to have very strong opinions on ellipsis use (negative) and exclamation marks (positive). Based on the example comments shown in §4.1.3 and §4.1.4, some inferences can be made regarding how they got to these assertions.

When ellipsis punctuation was used, speakers frequently uttered sentiments indicating a violation of the Maxims of Quantity and Manner[13]: respondents frequently stated (in their own words) that they were confused as to the exact nature of these messages – sometimes doubting whether to see them as genuine, sarcastic or in fact patently untruthful. Use of ellipses often led to feelings of insecurity and confusion, with respondents describing not knowing why the ellipses are there and in what way they were meant. Conversely, exclamation marks fulfilled this signalling role quite well, judging by both the sample comments and ANOVA results: respondents find the exclamation mark very unambiguous and a useful and informative addition to messages, thereby adhering to the previously mentioned maxims. Therefore, Grice's cooperative principle also seems to be in use in CMC environments, and respondents attach the same importance to these principles as they do in F2F conversations.

5.5.3   Cyberpragmatics: Yus' phatic internet and cyber-literacy. With regards to the

pragmatic theories outlined earlier, the answers to the open questions expressed sentiments on punctuation. These strengthen Yus' notion of a phatic internet: he states that our way of communicating online is more about maintaining personal ties than exchanging useful messages. Online communication consists more and more of personal, informal conversations and these conversations are conducted online more and more, as the number of people who prefer conversing digitally grows (Telegraph.co.uk, 2010, and Morris, 2018). Therefore, adhering to shared rules to avoid misunderstandings is essential in constructing and maintaining personal identities and relationships online. What others might describe as "idle chatter" on WhatsApp (Vetere et al., 180) actually holds meaning to respondents, and their bonds are strengthened through the adherence to certain codes. Punctuation helps in this matter; using (or refraining from) certain types of punctuation can be one of the ways in which people identify with or distance themselves from others. This indicates a kind of cyber-literacy (a phrase also coined by Yus).

Earlier in §4.1.3 (no punctuation) and §4.1.4 (period punctuation), special attention was paid to category 15 comments dealing with respondents' judgements of their interlocutor's age and aptitude, based on punctuation use. Some of the comments left there support the

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[13] To reiterate, the first maxim states that one needs to make their contribution as informative as is required, and not more informative than is required, while the Maxim of Manner tells the speaker/sender to "simply be clear", by avoiding ambiguity and obscurity of expression.

idea of a phatic internet and cyber-literacy, such as "This person just doesn't know how to text"; "Sound[s] like my mum"; "the parent had no idea how to use elipses [*sic*]"; "This is how my friends would reply"; "[…]Mother clearly is not hip to whatsapp lingo." These comments indicate that users have well-defined expectations about how someone is supposed to construct messages, how someone is not supposed to do so, and which types of communication fit with what type of person they are. Yus' theory helps explain why seemingly small and inconsequential markers such as punctuation would cause a reaction in people like Hannah Wagle, Dom Maduri (both examples shown earlier), and the survey respondents: these types of punctuation and the emotions connected to them do not fit with the feelings addressees would expect to receive in those situations. Given the relatively young nature of WhatsApp, this is a fascinating topic for further study, and more research will be very welcome to establish a stronger link between the use of punctuation, identity formation, and different user groups in CMC.

5.6   Study limitations

There were some limitations to the study which may be overcome in future research: due to the short time span of the research and the length of time the survey was up (three weeks), age and nativeness groups were not as equally balanced among respondents as initially aimed for. As a result, Millennials (19-35 years) now make up almost two-thirds of the participants; there was also a difference in number between native and non-native speaker participants. Furthermore, given the high number of open comments received (almost 5,500), only statistical information (ANOVA and t-test) on the different age and nativeness groups was obtained for the first (closed) question regarding social appropriateness; group statistics for the answers to the two open questions might have produced interesting results as well.

5.7   Topics for further study

This study acts as an important starting point for other avenues of further research: future studies could examine the effects between respondents of smaller, more differentiated age groups, or between more speakers from specific English-speaking countries. Data could also be gathered by applying statistical research to sentiment analysis (for open question 1 and 2) as was done for the 'social appropriateness survey' question here. That way, patterns might be drawn between what types of people for instance find an ellipsis point to signal

insincerity, and what types of people think of it as just a sign of uncertainty. Other future studies should also look at gender as a factor in punctuation interpretation, which might yield interesting results: perhaps men will interpret a period or an ellipsis differently from women. Furthermore, another important cue which denotes emotion and intent in CMC is an emoticon. These have largely been excluded from this paper, but might prove interesting source material for researchers: the digital representations of human faces have been widely described as a replacement for absent non-verbal cues in CMC (Walther & D'Addario, 2001) and have been extensively researched (Derks et al., 2007 & 2008, Dresner & Herring 2010, Ganster et al 2012, Walther & D'Addario 2001, Derks 2007). A separate study might look at how strong the punctuation effects found here are when they are contrasted with emoticons. Lastly, given that WhatsApp is inherently used to communicate with people one knows well, most social situations here concerned conversations with family members and friends. Therefore, most of them contained messages which were (in Gricean terms) inherently cooperative. While one situation did explore dealing with a boss, an interesting avenue of future research could be to look more closely at differences in punctuation interpretation when conversing with people the user does not like or know well.

5.8   Implications

Knowledge of how people use punctuation types differently, based on factors such as age or nativeness, will help interpret messages better and to estimate whether the sender intended a message in exactly the same way as the recipient reads it. Such knowledge can protect against unintended ways of reading a message and can be very helpful nowadays where so much communicating is done online. For instance, it has been shown that the use of ellipsis can in some cases lead to feelings of anxiousness or confusion and that respondents associate this punctuation type the least with positive feelings or feelings of security and reinforcement (§4.1.4). This knowledge can be very helpful in business communication but also aid in personal communication when interpreting messages from people of other ages or from other countries. Lastly, it also adds the available knowledge of linguistic identity formation and relationship maintenance in CMC.

5.9   Discussion

CMC can give rise to confusion and miscommunication (Riordan & Kreuz a, 2010) due to the absence of certain cues. The reverse seems true as well: when people, unaware of the

significance of markers such as (but not limited to) ellipsis include it where others would not, miscommunication or confusion can arise. The research undertaken uncovered what sentiments different users attach to punctuation types, and when they thought these punctuations were well placed or not. What this study has contributed is both a confirmation and an expansion of the ways in which punctuation was previously used. This research has amassed an expansive list of thoughts and feelings that respondents have about punctuation type usage, as well as a first insight into interpretation differences between groups of people.

When people communicate, they never just do so only out a desire to send a message. They also wish to convey a certain feeling or image of themselves along with it, either to persuade or to relay a part of their identity. Understanding what people really mean when they use certain types of punctuation, or what they are trying to effect by it, is helpful in more accurately gauging the intentions of one's interlocutor, both when highly phatic communication is used with a close friend, or when one's interlocutor is a colleague. Certain types of punctuation, at least in WhatsApp, have gone beyond their so-called 'original use' as set out in previous literature and are interpreted and used differently by different types of people. Internet linguists and sociolinguists find themselves at a unique moment in time, able to observe (and measure) language evolving in real-time. It will be interesting to see if and how these punctuation uses continue to change over time.

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7. APPENDIX

7.1 Survey links

The original Google survey can be accessed through https://tinyurl.com/survey1172255. It has been reactivated for (future) review purposes: please note that results will once again be submitted if the survey is run to the end. The initial Google Sheets export, containing all original survey answers can be found at http://tinyurl.com/thesispaper1172255. The sheet with all answers colour-coded can be found at https://tinyurl.com/1172255colour, while the sheet with all the answer converted to category numbers can be found at https://tinyurl.com/1172255numbers.

7.2. The survey's social situations (text)

Below is a textual overview of the social situations presented, with a context description and all four different possible replies given. Please refer to the original survey link above to see these social situations as fictional WhatsApp conversations, as seen by respondents.

Situation 1: The haircut

You have just been to the hairdresser's and are rather happy with your new haircut. You take a selfie and send it to your mother:

A: "I just got a new haircut!"

posts a picture of oneself with new haircut

B1: Awesome job. You look nice in this picture.

B2: Awesome job… You look nice in this picture...

B3: Awesome job! You look nice in this picture!

B4: Awesome job you look nice in this picture

Situation 2: A joke:

You exchange a joke with your friend. Your friend thinks it's funny:

A: Time for a riddle! :) ↓

A: What did the buffalo say when his son left for college? Bison.

Figure 7 Image sent instead of question A in the WhatsApp "chat screen".

B1 hahahaha good one. You're so funny.

B2 hahahaha good one… you're so funny…

B3 hahahaha good one! You're so funny!

B4 hahahaha good one youre so funny

Situation 3: Making plans with your parents (adapted from Maduri, 2018)

You and your parents have made plans to see each other next weekend. After a couple of messages of exchanging dates and locations, the conversation ends like this:

A: OK cool! Looking forward to it

B1 Sounds good.

B2 Sounds good…

B3 Sounds good!

B4 Sounds good

Situation 4: Texting your parents at night:

You are at home, having just spent the day at your parents'. You text your mum before going to bed:

A: It was lovely seeing you both today, hope to do it again soon!

A: Going to sleep now!

A: Goodnight!

B1 It was great having you here. Okay bye. See you soon.

B2 It was great having you here… Okay bye… see you soon…

B3 It was great having you here! Okay bye! See you soon!

B4 It was great having you here okay bye see you soon

Situation 5: Texting your boss (adapted from Bindley, 2018):

You have fallen ill, and after a rough night of barely sleeping, you send a text to your boss early in the morning and read their reply:

A: Hey

A: I'm sorry, but I feel really bad and can't come into work this morning. I will work from home today!

B1 That's fine.

B2 That's fine…

B3 That's fine!

B4 Thats fine

7.3 Data – Respondents' ages

Table 7.1 Full distribution of respondents' ages

	Frequency	Cumulative Percent
Valid 14	18	14.6
15	2	16.3
16	2	17.9
17	1	18.7
18	1	19.5
20	3	22.0
21	2	23.6
22	3	26.0
23	6	30.9
24	9	38.2
25	14	49.6
26	7	55.3
27	9	62.6
28	5	66.7
29	4	69.9
30	6	74.8
31	3	77.2
32	2	78.9
33	4	82.1
34	2	83.7
35	2	85.4
37	1	86.2
38	4	89.4
39	3	91.9
40	2	93.5
44	1	94.3
47	1	95.1
51	1	95.9
52	2	97.6
53	1	98.4
54	1	99.2
55	1	100.0
Total	123	

Table 7.2 Statistical breakdown of respondents' age

Valid	123
Mean	26.85
Std. Error of Mean	.85
Median	26.00
Mode	14
Std. Deviation	9.44
Variance	89.22
Range	41
Minimum	14
Maximum	55

7.4 Data – Respondent averages to survey question 1

Table 7.3 Average answers to all social situations relating to period use. N=123. Average = 3.6

	Minimum	Maximum	Mean	Std. Deviation
1. How socially appropriate do you find the response?	1.0	5.0	3.86	.98
4. How socially appropriate do you find the response?	1.0	5.0	3.65	1.04
6. How socially appropriate do you find the response?	1.0	5.0	3.56	.95
15. How socially appropriate do you find the response?	1.0	5.0	3.43	.92
16. How socially appropriate do you find the response?	1.0	5.0	3.65	.89

Table 7.4 Average answers to all social situations relating to ellipsis use. N=123. Average = 2.6

	Minimum	Maximum	Mean	Std. Deviation
3. Based on spelling. phrasing and tone. how socially appropriate do you find the response in this situation?	1.0	5.0	2.54	.91
7. How socially appropriate do you find the response?	1.0	5.0	2.83	1.01
9. How socially appropriate do you find the response?	1.0	5.0	2.69	1.00
13. How socially appropriate do you find the response?	1.0	5.0	2.52	.96
20. How socially appropriate do you find the response?	1.0	5.0	2.72	1.20

Table 7.5 Average answers to all social situations relating to the use of exclamation marks. N=123. Average = 4.2

	Minimum	Maximum	Mean	Std. Deviation
2. How socially appropriate do you find the response?	1.0	5.0	4.28	.91
5. How socially appropriate do you find the response?	1.0	5.0	4.23	.92
8. How socially appropriate do you find the response?	2.0	5.0	3.84	1.03
12. How socially appropriate do you find the response?	1.0	5.0	4.23	1.01
19. How socially appropriate do you find the response?	2.0	5.0	4.55	.70

Table 7.6 Average answers to all social situations relating without punctuation. N=123. Average = 3.4

	Minimum	Maximum	Mean	Std. Deviation
10. How socially appropriate do you find the response?	1.0	5.0	3.17	1.02
11. How socially appropriate do you find the response?	1.0	5.0	3.77	.97
14. How socially appropriate do you find the response?	1.0	5.0	3.17	.98
17. How socially appropriate do you find the response?	1.0	5.0	3.59	.94
18. How socially appropriate do you find the response?	1.0	5.0	3.48	.97

7.5 Data – Full tables for respondents' opinions to open questions 1 and 2 (§4.1.3 & 4.1.4)

Open Question 1

Table 7.7 The results per category for punctuation employing periods.

	1	2	3	4	5	6	7	9	11	12	13	14	15	16	17
	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
1.	1	6	0	0	1	13	10	0	64	7	3	3	10	14	5
4.	0	9	5	1	0	22	21	1	48	9	1	16	9	6	2
6.	0	23	1	0	2	23	31	3	32	13	2	3	1	2	3
15.	25	24	3	0	2	17	4	0	36	7	4	10	1	1	2
16.	1	8	1	1	3	15	23	0	36	29	2	3	1	0	3
Total	27	70	10	2	8	90	89	4	216	65	12	35	22	23	15

Table 7.8 The results per category for punctuation employing ellipsis.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
3.	4	76	10	7	1	12	12	1	2	0	4	1	2	18	1	5	2
7.	2	15	21	7	0	12	5	2	4	1	17	4	19	23	16	3	4
9.	8	41	16	8	1	12	4	3	1	0	16	4	7	12	7	4	5
13.	4	46	24	14	1	10	1	2	1	0	8	6	4	11	5	2	1
20.	36	40	16	0	0	1	0	0	0	5	17	1	13	14	1	2	2
Total	54	218	87	36	3	47	22	8	8	6	62	16	45	78	30	16	14

Table 7.9 The results per category for punctuation employing exclamation marks.

	1	2	3	4	5	6	7	9	10	11	12	13	14	15	16	17
	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
2.	0	2	1	1	2	8	7	1	0	93	9	3	5	2	7	1
5.	0	4	0	1	0	5	5	1	1	92	5	1	4	1	7	3
8.	0	9	3	0	0	6	8	0	1	80	9	3	11	0	5	5
12.	9	13	2	1	0	0	1	0	0	83	5	1	2	0	9	1
19.	0	0	0	0	0	2	0	0	0	112	5	1	0	0	1	3
Total	9	28	6	3	2	21	21	2	2	460	33	9	22	3	29	13

Table 7.10 The results per category for messages without any punctuation.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
10.	0	4	7	1	0	47	1	0	1	1	19	23	3	22	18	4	4
11.	0	3	1	1	1	19	10	0	1	0	38	34	3	8	2	10	1
14.	0	9	8	1	2	31	19	2	0	0	21	34	2	7	0	3	1
17.	15	15	7	1	0	17	1	0	0	1	47	11	2	16	3	7	4
18.	0	8	10	1	0	25	4	0	1	0	46	15	0	5	10	7	6
Total	15	39	33	5	3	139	35	2	3	2	171	117	10	58	33	31	16

Open Question 2

Table 7.11 The results per category for punctuation employing periods.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
1.	0	5	7	0	0	5	10	0	4	0	58	24	2	2	7	2	5
4.	0	9	8	0	2	7	1	5	10	1	38	31	1	6	8	3	6
6.	0	6	3	4	3	4	6	5	11	1	42	33	4	1	0	1	5
15.	5	14	18	0	0	8	3	3	8	1	33	24	1	2	1	3	8
16.	0	6	7	1	1	12	7	1	3	1	26	54	0	2	2	1	8
Total	5	40	43	5	6	36	27	14	36	4	197	166	8	13	18	10	32

Table 7.12 The results per category for punctuation employing ellipsis.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
3.	1	19	18	0	2	3	3	30	23	6	4	8	5	2	1	1	7
7.	0	10	30	3	1	3	1	12	11	5	14	14	11	14	5	0	8
9.	2	10	23	0	0	6	1	12	12	10	13	14	11	6	3	5	9
13.	0	13	28	7	0	7	0	17	16	5	4	15	9	1	1	2	5
20.	2	13	17	0	0	1	1	6	27	8	19	15	7	6	1	5	7
Total	5	65	116	10	3	20	6	77	89	34	54	66	43	29	11	13	36

Table 7.13 The results per category for punctuation employing exclamation marks.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
2.	0	0	4	0	2	5	1	3	1	0	77	21	6	0	1	3	5
5.	0	2	3	0	0	2	3	1	3	0	88	14	2	2	0	1	7
8.	0	4	5	1	2	0	3	4	2	0	68	23	5	2	0	2	8
12.	3	3	7	0	0	1	0	2	3	2	78	16	0	0	1	3	5
19.	0	0	3	0	0	1	0	0	1	0	99	11	0	2	0	0	8
Total	3	9	22	1	4	9	7	10	10	2	410	85	13	6	2	9	33

Table 7.14 The results per category for messages without any punctuation.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count	Count
10.	0	10	8	1	1	13	1	4	8	4	21	38	1	10	6	5	10
11.	0	6	4	0	0	9	4	0	1	2	36	56	3	2	1	2	4
14.	0	6	12	0	2	7	2	7	9	1	20	50	3	4	0	4	6
17.	1	11	10	0	0	7	1	1	3	1	44	38	0	8	1	2	8
18.	0	5	6	0	0	9	1	1	7	2	47	30	3	4	1	2	10
Total	1	38	40	1	3	45	9	13	28	10	168	212	10	28	9	15	38

7.6 Data – Full tables of two-way ANOVA results

<u>Period:</u>

Table 7.15

Tests of Between-Subjects Effects
Dependent Variable: PERIOD AVERAGE

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.400[a]	3	.467	1.136	.338
Intercept	1502.313	1	1502.313	3656.190	.000
Agegroup	.448	1	.448	1.091	.298
NativeSpeaker	.794	1	.794	1.933	.167
Agegroup * NativeSpeaker	.106	1	.106	.259	.612
Error	48.897	119	.411		
Total	1674.760	123			
Corrected Total	50.297	122			

a. R Squared = .028 (Adjusted R Squared = .003)

Estimated Marginal Means

Table 7.16

1. Age group
Dependent Variable: PERIOD AVERAGE

Age group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	3.71	.08	3.540	3.891
2	3.58	.08	3.426	3.752

Table 7.17

2. Native Speaker
Dependent Variable: PERIOD AVERAGE

Native Speaker	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
No	3.56	.07	3.423	3.713
Yes	3.73	.09	3.546	3.926

Table 7.18

3. Age group * Native Speaker
Dependent Variable: PERIOD AVERAGE

Age group	Native Speaker	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	No	3.66	.09	3.466	3.858
	Yes	3.76	.14	3.477	4.060
2	No	3.47	.10	3.260	3.689
	Yes	3.70	.12	3.459	3.948

<u>Ellipsis:</u>

Table 7.19

Tests of Between-Subjects Effects
Dependent Variable: ELLIPSIS AVERAGE

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3.452[a]	3	1.151	1.976	.121
Intercept	782.889	1	782.889	1344.483	.000
Agegroup	3.070	1	3.070	5.272	.023
NativeSpeaker	.743	1	.743	1.276	.261
Agegroup * NativeSpeaker	.205	1	.205	.353	.554
Error	69.293	119	.582		
Total	945.280	123			
Corrected Total	72.745	122			

a. R Squared = .047 (Adjusted R Squared = .023)

Estimated Marginal Means

Table 7.20

1. Age group
Dependent Variable: ELLIPSIS AVERAGE

Age group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	2.47	.10	2.262	2.680
2	2.80	.09	2.608	2.995

Table 7.21

2. Native Speaker
Dependent Variable: ELLIPSIS AVERAGE

Native Speaker	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
No	2.71	.08	2.545	2.891
Yes	2.55	.11	2.329	2.781

Table 7.22

3. Age group * Native Speaker
Dependent Variable: ELLIPSIS AVERAGE

Age group	Native Speaker	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	No	2.59	.11	2.362	2.828
	Yes	2.34	.17	2.001	2.694
2	No	2.84	.12	2.585	3.095
	Yes	2.76	.14	2.472	3.054

Exclamation mark:

Table 7.23

Tests of Between-Subjects Effects
Dependent Variable: EXCLAMATION AVERAGE

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.254[a]	3	.085	.232	.874
Intercept	2027.546	1	2027.546	5565.987	.000
Agegroup	.104	1	.104	.287	.593
NativeSpeaker	.097	1	.097	.267	.606
Agegroup * NativeSpeaker	.132	1	.132	.363	.548
Error	43.349	119	.364		
Total	2245.360	123			
Corrected Total	43.603	122			

a. R Squared = .006 (Adjusted R Squared = -.019)

Estimated Marginal Means

Table 7.24

1. Age group
Dependent Variable: EXCLAMATION AVERAGE

Age group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	4.27	.08	4.108	4.438
2	4.21	.07	4.059	4.365

Table 7.25

2. Native Speaker
Dependent Variable: EXCLAMATION AVERAGE

Native Speaker	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
No	4.21	.06	4.077	4.350
Yes	4.27	.09	4.093	4.451

Table 7.26

3. Age group * Native Speaker

Dependent Variable: EXCLAMATION AVERAGE

Age group	Native Speaker	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	No	4.21	.09	4.025	4.394
	Yes	4.33	.13	4.063	4.611
2	No	4.21	.10	4.015	4.419
	Yes	4.20	.11	3.977	4.437

No punctuation:

Table 7.27

Tests of Between-Subjects Effects

Dependent Variable: NONE AVERAGE

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4.017[a]	3	1.339	2.867	.040
Intercept	1367.319	1	1367.319	2927.506	.000
Agegroup	.297	1	.297	.635	.427
NativeSpeaker	3.721	1	3.721	7.967	.006
Agegroup * NativeSpeaker	.057	1	.057	.122	.728
Error	55.580	119	.467		
Total	1515.680	123			
Corrected Total	59.597	122			

a. R Squared = .067 (Adjusted R Squared = .044)

Estimated Marginal Means

Table 7.28

1. Age group

Dependent Variable: NONE AVERAGE

Age group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	3.53	.09	3.348	3.723
2	3.43	.08	3.259	3.606

Table 7.29

2. Native Speaker

Dependent Variable: NONE AVERAGE

Native Speaker	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
No	3.30	.07	3.148	3.457
Yes	3.66	.102	3.463	3.868

Table 7.30

3. Age group * Native Speaker

Dependent Variable: NONE AVERAGE

Age group	Native Speaker	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	No	3.37	.10	3.167	3.585
	Yes	3.69	.15	3.384	4.005
2	No	3.22	.11	3.000	3.457
	Yes	3.63	.13	3.377	3.897

7.7. Data – Full tables of T-test results

<u>Age:</u>

Table 7.31 Group statistics and I.S. test for age as a factor.

Group Statistics

	Age group	N	Mean	Std. Deviation	Std. Error Mean
PERIOD AVERAGE	1	61	3.69	.66	.08
	2	62	3.57	.61	.07
ELLIPSIS AVERAGE	1	61	2.51	.71	.09
	2	62	2.80	.80	.10
EXCLAMATION AVERAGE	1	61	4.24	.62	.08
	2	62	4.21	.57	.07
NONE AVERAGE	1	61	3.47	.60	.07
	2	62	3.40	.78	.09

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PERIOD AVERAGE	Equal variances assumed	1.248	.266	1.044	121	.298	.1209	.1157	-.1083	.3500
	Equal variances not assumed			1.044	120.050	.299	.1209	.1158	-.1084	.3502
ELLIPSIS AVERAGE	Equal variances assumed	.069	.793	-2.100	121	.038	-.2884	.1374	-.5603	-.0165
	Equal variances not assumed			-2.102	119.707	.038	-.2884	.1372	-.5601	-.0167
EXCLAMATION AVERAGE	Equal variances assumed	.291	.590	.335	121	.738	.0363	.1082	-.1779	.2505
	Equal variances not assumed			.335	119.727	.738	.0363	.1083	-.1781	.2507
NONE AVERAGE	Equal variances assumed	2.756	.099	.546	121	.586	.0690	.1264	-.1813	.3192
	Equal variances not assumed			.547	114.485	.586	.0690	.1261	-.1809	.3188

Nativeness:

Table 7.32 Group statistics and I.S. test (turn page) for nativeness as a factor.

Group Statistics

	Native Speaker (1=Y. 2=N)	N	Mean	Std. Deviation	Std. Error Mean
PERIOD AVERAGE	1	46	3.73	.60	.08
	2	77	3.57	.66	.07
ELLIPSIS AVERAGE	1	46	2.59	.67	.10
	2	77	2.70	.82	.09
EXCLAMATION AVERAGE	1	46	4.26	.61	.09
	2	77	4.21	.59	.06
NONE AVERAGE	1	46	3.66	.70	.10
	2	77	3.30	.66	.07

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PERIOD AVERAGE	Equal variances assumed	.647	.423	1.289	121	.200	.1538	.1193	-.0824	.3901
	Equal variances not assumed			1.319	101.615	.190	.1538	.1166	-.0775	.3852
ELLIPSIS AVERAGE	Equal variances assumed	1.997	.160	-.799	121	.426	-.1152	.1441	-.4005	.1701
	Equal variances not assumed			-.839	108.936	.403	-.1152	.1373	-.3874	.1570
EXCLAMATION AVERAGE	Equal variances assumed	1.059	.305	.428	121	.669	.0479	.1118	-.1734	.2692
	Equal variances not assumed			.425	92.306	.672	.0479	.1127	-.1760	.2718
NONE AVERAGE	Equal variances assumed	.071	.790	2.774	121	.006	.3518	.1268	.1007	.6028
	Equal variances not assumed			2.735	90.644	.007	.3518	.1286	.0963	.6073

7.8 Order of randomised survey questions

This page reveals the order in which respondents were shown randomised social situations in the survey (this aids in understanding the tables in §7.5). This page was only used as a reference tool for the researchers during results processing and was never shown to respondents.

Order				*Situation:*		
1	2	3	4	5	**E1 =** The haircut	**[1] =** .
E1O1	E4O3	E5O2	E4O1	E1O3	**E2 =** A joke	**[2] = …**
[.]	[!]	[...]	[.]	[!]	**E3 =** Making plans/looking forward to it	**[3] = !**

[VIDEO BREAK 1]

E4 = Texting at night ('going to sleep now')   **[4] = none**

E5 = Texting your boss

6	7	8	9	10
E5O1	E4O2	E5O3	E1O2	E4O4
[.]	[...]	[!]	[...]	[none]

[VIDEO BREAK 2]

11	12	13	14	15
E3O4	E2O3	E3O2	E5O4	E2O1
[none]	[!]	[...]	[none]	[.]

[VIDEO BREAK 3]

16	17	18	19	20
E3O1	E2O4	E1O4	E3O3	E2O2
[.]	[none]	[none]	[!]	[...]

SS1 = . **situations are: 1, 4, 6, 15, 16**

SS2 = … **situations are: 3, 7, 9, 13, 20**

SS3 = ! **situations are: 2, 5, 8, 12, 19**

SS4 = none **situations are: 10, 11, 14, 17, 18**