Interactive alignment in Polish:
A CMC-based study

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Abstract

One of the focuses of psycholinguistic research has been producing and understanding language (c.f. Griffin and Ferreira 2006; Pardo and Remez 2006). Until very recently (Bock 1986), such research primarily concerned understanding or producing isolated sentences or words. However, using language in isolation constitutes a minor part of how people interact. In response, Pickering and Garrod proposed the *interactive alignment model*, which is supposed to explain the processes which are engaged in comprehension and production in dialogue. This paper addresses the issue of the interactive alignment model in Polish in computer-mediated communication. The article first outlines the theoretical background for the research by describing the semantic and syntactic aspects of language production and comprehension. Next, it introduces the concept of the interactive alignment model and lays down its main tenets. Finally, the paper describes the research method and the qualitative analysis of the results of the experiment conducted for the purposes of the study.

Keywords

syntactic alignment, computer-mediated communication, conversation analysis, syntactic priming

Dopasowanie interakcyjne w komunikacji internetowej

Abstrakt

Psycholingwistyka od lat zajmuje się badaniem procesów związanych z wytwarzaniem i rozumieniem języka (por. Griffin i Ferreira 2006; Pardo i Remez 2006). Do niedawna (np. Bock 1986) badania tego rodzaju skupiały się głównie na wytwarzaniu bądź rozumieniu pojedynczych, wyizolowanych zdań. Jednakże taki kontekst występowania języka stanowi jedynie mały procent sposobu używania języka i interakcji. W odpowiedzi na taki stań badań Pickering i Garrod (2004) sformułowali *model dopasowania interakcyjnego* (ang. *the interactive alignment model*), który według autorów ma tłumaczyć procesy rozumienia i produkcji języka, zachodzące w konwersacji. Niniejszy artykuł ma na celu zbadanie tego modelu w środowisku komunikacji internetowej prowadzonej w języku polskim. Na artykuł składają się dwie części. Pierwsza, czyli teoretyczna, część artykułu omawia składniowe oraz semantyczne zagadnienia konwersacji, jak i również przedstawia model dopasowania. Druga część artykułu przedstawia sposób zbierania danych, metodologię oraz wyniki badania.

Słowa kluczowe

dopasowanie składniowe, komunikacja internetowa, analiza konwersacji, torowanie składniowe

1. Introduction

The means by which people produce and understand linguistic messages is the main focus of psycholinguistic research (Griffin and Ferreira 2006; Pardo and Remez 2006). Although initially studied only in monologue (Bock 1986; Branigan et al. 1995), production and comprehension started to be investigated from the dialogical perspective, too (Branigan et al. 2000). This turn was highlighted by Pickering and Garrod's notion of the *interactive alignment account* (2004). The model assumes that in dialogue, there is a parity between production and

comprehension and that speakers *align* their representations at different levels: phonological, lexical, syntactic, and situational (Pickering and Garrod 2004: 1). The paper tests the *interactive alignment account* (and, most notably its syntactic and lexical components) against data obtained from dialogues conducted in Polish via computer-mediated communication. Importantly, this experiment is the first of its kind to be conducted with participants communicating in Polish.

2. Lexical and syntactic priming

Lexical and syntactic priming are both significant concepts in psycholinguistics. From the perspective of this study, they are also key to understanding the interactive alignment account, as these two mechanisms participate in aligning representations. By the same token, both mechanisms are phenomena which influence language comprehension and production.

Lexical (or semantic) priming refers to a situation in which if individuals are exposed to a certain lexical element, it is easier for them to process another word from a related category; thus, if one is exposed to the word *fruit,* it is easier to process *raspberry.* Moreover, this type of priming also accounts for choosing particular interpretations of polysemous words; hence, if the subject of a conversation is about making a reservation in a restaurant, the word *book* will be analysed and used as a verb meaning *to make a reservation* (Foss 1982: 590–591). This phenomenon is theorised to stem from activation processes (e.g. Reisberg 1997, Neely 1977, Lavigne et al. 2016).

There are two explanations of this phenomenon. Firstly, lexical priming is explained by the fact that lexical access is modified. Since a related category is activated, the representation of a word is "left in a state of increased accessibility" (Forster and Davis 1984: 680). The other explanation states that it is connected with memory processes. Here, an exposure to a certain word leaves a trace in episodic

memory which is reactivated whenever the same word occurs (Forster and Davis 1984: 60).

Syntactic priming describes the phenomenon in which the structure of one utterance influences the structure of other utterances which are not necessarily related in semantic terms (Branigan et al. 1995: 490). Importantly, the resemblance in structure may provide some insights into how the cognitive system works: if, in terms of sentence structure, the cognitive system recognises the relationship between two utterances, and the first utterance influences the other utterance in terms of syntax only, it means that the cognitive system is sensitive to the sentence structure and recognises the two utterances "as related within that dimension" (Branigan et al. 1995: 491). Consider:

(1) *The professor gave the student a grade.*
(2) *The boy gave the dog a treat.*

Although semantically and lexically distinct, these two sentences are syntactically related, i.e. both of them are derived from the following rules: S → NP VP; VP → V NP NP; NP → Det N and give the following double-object structure:

[[Det N]$_{NP}$ [V [Det N]$_{NP}$ [Det N]$_{NP}$]$_{VP}$]$_S$

Based on the syntactic representation of examples (1) and (2), it is clear that both sentences are identical in terms of structure. Hence, if the processing of sentence (1) influences the processing of sentence (2), the cognitive system might be assumed to be sensitive to syntactic information and able to recognise the two sentences as being similar. Priming can be subdivided into three categories.

The first type is *production-to-production* priming. It was first observed and empirically tested by Bock (1986). The author started her research on the aspect of structure in sentence production because, as she stated, although speakers have the capacity to generate an unlimited set of

strings, they still tend to use the same structure in sentences (Bock 1986: 355–356). She found that demonstrating either a double-object or a prepositional-object construction resulted in re-employing the same structure in the next utterances of a single speaker (Branigan et al. 1995: 494). Other experiments (Pickering and Branigan 1995) found that the same phenomenon occurs in the written modality.

Next comes *comprehension-to-comprehension priming.* Experimental evidence presented by Mehler et al. (1967), Frazier et al. (1984) and Branigan et al. (1995) suggests that exposure to an utterance facilitates the subsequent processing of similar utterances. Consider the typical garden-path sentences below:

(3) *The old man the boat.*
(4) *The prime number few.*

Having been exposed to utterance (3), participants of experiments generally read utterance (4) faster and have fewer or no problems with providing the right interpretation. Such effects are not present across sentences which are semantically and lexically related but syntactically unrelated (Branigan et al. 1995: 496).

The last type of priming discerned by Branigan et al. (1995) is *comprehension-to-production* priming. Two experiments have shown that priming also occurs between comprehension and production. First of all, it is evident in interaction, when the form of the question influences the form of the answer. For example, if one is asked: *What time do you close?* the answer is *5 o'clock*, whereas if one is asked *At what time do you close?* the answer is *At 5 o'clock* (Levelt and Kelter 1982). This phenomenon can be explained by making an assumption that in question-answer pairs, the answer inherits the verb and the syntactic structure of the question. Such observations have also been made for semantically unrelated sentences (Pickering and Branigan 1995). When participants of experiments had to finish written sentences, they typically used the

same structure which was employed in the previous sentence (Branigan et al. 1995: 498).

Priming, apart from being a significant element of the interactive alignment account, primarily yields two important assumptions for sentence processing and for linguistic theory as a whole (Branigan et al. 1995: 498).

Concerning sentence processing, priming shows that previous sentences are taken into consideration by the processor in analysing sentences. As laid out above, it is clearly visible in experiments in which participants have to read garden-path sentences. (Branigan et al. 1995: 498). Furthermore, Branigan et al. (1995) suggest that the priming mechanism could reveal what information is used by speakers when they analyse and produce sentences. Firstly, the process probably employs some of the features which phrase structure grammars describe and it also proves that since, notwithstanding the verb, structure is re-employed, it means that syntactic information is attached to a class of verbs rather than to individual lexemes (Branigan et al. 1995: 500).

Although it does not have any significance for linguistic theory conceived in formalist terms, priming does play an important role for cognitive linguistics because it provides the type of characterisation which cognitive linguistic theories seek to depict. Priming provides this characterisation by assuming that since one structure influences another, both in production and in comprehension, then they must reside in the same mental category and must be somehow related. Furthermore, these structures must draw upon the same type of information. Branigan et al. (1995: 502) propose that this information is syntactic.

3. Lexical choices

What is also important in the *interactive alignment account,* apart from syntactic information, is the lexemes interlocutors use and what motivates them to choose a particular word with

a particular referent. *Conceptual pacts*, as formulated by Brennan and Clark (1996) provide the answer to the issue.

Initially there were two competing theories explaining why particular words are chosen in conversations: ahistorical and historical. The first theory stated that the only aspect that speakers take into consideration while choosing an appropriate word is information saliency. The information provided by one speaker should allow the other one to distinguish an element from a set of similar elements. Thus, if there is a large set of shoes, one has to identify types, for example *loafers*. On the other hand, if the set is not so extensive, or if only one pair of shoes is visible, the speaker may simply use the label *shoes* (Brennan and Clark 1996: 1482). However, since the interactive alignment model states that earlier information participates in the work of the sentence processor, the historical model is a more appropriate model of referring.

The historical model of referring, on the other hand, enumerates four key factors which play a role in choosing a referent: *recency, frequency of use, provisionality* and *partner specificity*. Information saliency is thus backgrounded. The first factor in choosing a referent is recency. Conceptualisations of referents are generally expected to be the same as in their most recent use. This assumption is in line with Garrod and Anderson's (1987) input/output model, which states that interlocutors create a new message applying the same semantic rules they have used to interpret the received message. Next comes frequency of use. It simply means that if a speaker uses a given conceptualisation of a referent more often, the memory of a mental representation is clearer. Coupled with recency, it explains situations in which speakers provide more informationally salient lexemes than required. For instance, if one recently had to refer on multiple occasions to a pair of shoes as *loafers*, the person will continue using this word also in cases when it is not necessary. Another important factor is provisionality. All conceptualisations in conversations are provisional; they can be accepted, modified

or replaced when they are grounded. Thus, a conceptualisation may differ from the one initially proposed. The final aspect is partner specificity. Speakers tend to adapt to their current interlocutor by entering into a *conceptual pact* with him or her. This pact is defined as a "temporary agreement about how the referent is to be conceptualised". New conceptual pacts are established whenever the conversation partner changes. Importantly, all four features should be treated cumulatively (Brennan and Clark 1991: 1483–1484).

4.   Interactive alignment account

The interactive alignment account is an idea proposed by Pickering and Garrod (2004) which explains how speakers successfully communicate in a dialogue. The account goes against traditional psycholinguistic research, which focused primarily on the study of monologue. The picture of language use obtained from this type of research was therefore incomplete. Although researching interaction in psycho-linguistics may appear to be revolutionary, it has been emphasised in a number of publications from other areas of linguistics and philosophy (e.g. Searle 1969, Sacks et al. 1974, Clark 1996).

4.1. Alignment of situation models

A successful dialogue involves interlocutors aligning their representations at different levels (phonetic, phonological, lexical, syntactic and situation model) via a priming mechanism (Pickering and Garrod 2004: 1). A dialogue is successful when the interlocutors' representations are aligned. In effect, the flow of information is easier and processing messages is less costly. If alignment via a priming fails, repair mechanisms get involved. Importantly, the existence of align-ment in dialogue between speakers is inferred from empirical evidence. The following part of the section describes *how* exactly speakers align in dialogue at the aforementioned levels

and describes the model in greater detail (Pickering and Garrod 2004: 7).

To begin with, the first element which may become aligned involves situation models. A *situation model* is defined as a mental representation of the subject of conversation: "the key dimensions encoded in situation models are space, time, causality, intentionality, and reference to main individuals under discussion" (Zwaan and Radvansky 1998 in Pickering and Garrod 2004: 4). The model is believed to encompass all of the information people process when they are engaged in a dialogue. Although their alignment is not essential, the lack thereof renders a conversation highly inefficient. Furthermore, maintaining two different representations of situation models (one's own and the interlocutor's) might be highly costly. Yet, the maintenance of two different situation models is sometimes necessary, as in the case of one interlocutor trying to deceive the other or in arguments where an agreement is not reached—although in such cases speakers do conceptualise other aspects in the same way, for instance designation and reference (Pickering and Garrod 2004: 4–5).

4.2. Alignment mechanism

Although a situation in which speakers align their situation models via overt negotiation is conceivable and possible, it hardly ever happens. The meanings of words are infrequently negotiated and definitions for words are not frequently provided, either. In contrast, it seems that speakers align globally (at the level of situation models) based on local routines (at the linguistic level). Pickering and Garrod suggest that alignment is achieved through a priming mechanism. Within the framework of the interactive alignment account, it means that encountering an utterance tied to a particular aspect of the situation model will make it more likely that same utterance will be used with reference to the same aspect of the situation model. This assumption about producing and comprehending utterances is in line with the *input/output*

principle proposed by Garrod and Anderson (1987) whereby speakers use the same conceptualisations in production and comprehension (Pickering and Garrod 2004: 5).

The bulk of this section has been devoted to the discussion of how alignment of situation models occurs. However, as mentioned earlier, these alignments result from the development of local routines which also need to be discussed in detail in order to obtain a firm grasp of the process.

Experimental evidence (also mentioned in the section devoted to priming) indicates that conversations are full of repeated items, whether syntactic or lexical. These repetitions are evident not only in production, but also in question and answer pairs. Speakers tend to reuse structures and words largely because of priming mechanisms, which were described earlier. Furthermore, as Branigan et al. (2000) say "priming activates representations and not merely procedures that are associated with production (or comprehension)". This state-ment is important for the interactive alignment account since production and comprehension are assumed to be at parity (Pickering and Garrod 2004: 6).

The priming mechanism works across different levels of representation. For instance, aligning syntax is easier when more words are shared between speakers. The same is true for semantic relations between lexical items. Facilitated alignment is even more visible especially in cases where verbs are repeated. What these facts mean is that alignment is not achieved at each level independently, but that alignment at one level facilitates the same at other levels (Pickering and Garrod 2004: 7).

Another feature which makes this account different from other models of sentence processing and interaction is its view on maintaining common ground. Common ground is understood here as the background information which the speakers share. Traditionally, it has been assumed that in order for interlocutors to convey information successfully, they need to share a common ground. However, the interactive alignment account argues that this process would be too costly

and, in fact, interlocutors base the alignment of situation models on a highly automated process of lower-level alignment. They merely use the implicit common ground to reach the alignment and use the full common ground only when a serious *repair* is necessary (Pickering and Garrod 2004: 10).

The traditional view of the common ground assumed that interlocutors maintain the common ground independently, which means that speaker A has to model both his own and speaker B's situation model and *vice versa*. However, Pickering and Garrod (2004: 10) assume that this would be too costly and, actually, speakers maintain an *implicit common ground*. In this view, speakers model only one situation model which includes the data which has either been produced or comprehended by the speakers. Consequently, both speakers' common ground includes approximately the same information. Initially, there might be some discrepancies between what data each speakers' common ground includes, but over the course of a conversation, this amount decreases. Since there is only one situation model, speakers do not have to infer what their interlocutor's model includes (Pickering and Garrod 2004: 10).

The alignment model is not foolproof and sometimes speakers must recover from misalignment. In such cases, they may rely on interactive repair using either implicit or full common ground, which are described above. The former uses two processes: a) checking the input information against one's own representation and b) if the first attempt is unsuccessful, reformulating the utterance in order to establish implicit common ground. It is evident in cases when speakers reformulate their utterances or in clarification requests. Speakers can be said to draw inferences from dialogue; however, they do so jointly. When this basic mechanism fails to recover the speaker from misalignment, a more complex full common ground repair is employed. In this case, speakers explicitly negotiate their situation models: as in cases of different viewpoints and when one speaker lies to the other (Pickering and Garrod 2004: 11–12).

5. Conversation analysis

In their paper "A simplest systematics for the organization of turn-taking for conversation", Sacks et al. (1974) laid out the principles of conversation analysis (CA). Additionally, they noted the importance of turn-taking organisation, inherent to every conversation.

Turn-taking is present in a variety of human activities, ranging from extralinguistic to purely linguistic ones; it organises terms in political offices, moves in games, as well as the structure of conversations and debates. The model of turn-taking organisation assumes that speakers change in a conversation, that an utterance can be classified according to its turn-constructional unit, and that turn-allocation techniques exist (Sacks et al. 1974: 700–701). The authors provide a longer list of features (cf. Sacks et al. 1974: 700–701); however, for the purposes of the present paper it is too extensive because the full list is incompatible with the specificity of computer-mediated communication.

All utterances comprise of turn-constructional components, which describe the type of structure speakers use to create a turn. These components include a sentence, clause, phrase and word. Each speaker, by uttering a unit, is entitled to realise it in its entirety. Once the speaker reaches the end of such a unit, a transition-relevance place occurs (cf. Sacks et al. 1974: 702-703).

Turn-allocation techniques can be broken down into two categories: instances when the current speaker selects the next one or instances with self-selection. Importantly, the turn-allocation techniques are governed by rules. These rules state that a shift occurs at a transition-relevance place at the initial point of a turn-constructional unit. Turn-taking can be organised in such a way that the current speaker selects next and anyone selected is obliged to speak. Otherwise self-selection occurs. However, if no-one elects to speak, then the current speaker may continue. Importantly, the current speaker may continue speaking if the two first techniques have

not been applied at a transition-relevance place. Once a turn is finished, the rules re-apply (Sacks et al. 1974: 704).

6. Computer-mediated communication

Since the material analysed in the empirical part of the paper originates from conversations conveyed via a chat client, the peculiarities of computer-mediated communication (henceforth CMC) require a proper description. CMC is an area of study which has existed for a number of years, but the 1990s marked the milestone for this field due to the proliferation of personal computers (Thurlow et al. 2004: 15).

Thurlow et al. (2004) comment on three distinct definitions of CMC. The one proposed by Santoro (Santoro 1995: 11 in Thurlow et al. 2004: 15) states that this form of communication involves "all computer uses" since monetary analyses, programs and systems all belong to forms of human communication. December (1997 in Thurlow et al. 2004: 15) states that CMC encompasses people communicating via computers and engaging in processes which shape media. Finally, Herring (1996: 1 in Thurlow et al. 2004: 15) simply states that CMC is the communication of people with the use of computers. However, these three definitions are contradicted by areas of interest of journals devoted to CMC, which are primarily concerned with human activity and interaction on the internet (Thurlow et al. 2004: 16).

CMC can be characterised in a number of ways. First of all, CMC can be text-based, graphics-based, audio-visual or include all modalities. Furthermore, it is conducted both in professional and non-professional settings, private or public. Finally, conversation in CMC can be either synchronous or asynchronous; the former means that there is an instant interaction between interlocutors whereas the latter involves a greater span of time between responses (Thurlow et al. 2004: 32).

7. Conversation in CMC

Face-to-face and computer-mediated communication differ for
reasons that are clear. Important elements which are present
in face-to-face communication may simply be absent in the
mediated, text-based version. The most prominent feature
which is absent is the lack of non-verbal cues. Furthermore,
the adjacency of units and turns is disrupted. (Anderson et al.
2010) Thus, scholars have sought to describe how people
adapt to this unnatural medium of communication. One
important study into the local management of conversations
was conducted by Anderson et al. (2010) in which they tested
how people behave conversationally when they use nearly
simultaneous text-based chat client.

When it comes to turn-allocating methods found in the
experimental data by Anderson et al. (2010), there were
instances of all methods: the current speaker selecting the
next one, self-selection and continuation all occurred.
However, in the majority of cases, speakers self-selected
(Anderson et al. 2010).

When it comes to gaps and overlaps, they tend not to occur
in natural, face-to-face conversations. In contrast, in CMC
they tend to occur quite often. In total, 30% of turns were the
ones in which two speakers sent their message at the same
time. The authors attributed this to the fact that some
participants elected to speak prematurely. These early
projections of turns started at a transition-relevance place. The
resulting overlaps are typically managed with the use of
delayed completion: a conversant produces a part of an
utterance and then waits for some time to ensure that other
interlocutors are ready to receive the remaining part. Typically,
despite the overlap, other participants are able to recognise
that what the speaker is saying should be attached to the
previous turn (Lerner 1989: 167 in Anderson et al. 2010).
Moreover, there were 37 gaps attested in the corpus which
were as long as 12 seconds (Anderson et al. 2010).

Finally, the distribution of pauses was not random. Conversation in a text-based CMC is characterised by turns which are followed by lengthier pauses than in face-to-face conversations. Anderson et al. (2010) provide the explanation that "[p]ausing provides opportunities for the participants to decode and encode utterances cognitively, as well as to initiate and respond to talk".

To sum up, turn-taking in CMC differs from turn-taking in face-to-face conversations. Other differences include the predominance of syntactically complete turns (as opposed to phrases and single words which are frequent in face-to-face communication), relying on delayed completion, and using pauses strategically so that others can take time to decode the message.

8. The cooperative principle

Apart from describing the structure of conversation and its organisation, in order to obtain a full picture of the nature of human interaction, it is also necessary to turn to H. P. Grice's "Logic and Conversation" (1975), where the cooperative principle was introduced.

In the paper, Grice observes that human conversation is typically a cooperative effort in which the parties involved recognise that they have a common purpose which they want to achieve. Whether the purpose is known from the very beginning or emerges in the course of a conversation is of little importance. What is important is the fact that at some point certain moves are expected to be made by speakers and behaving in an unexpected way would be found unsuitable. Taking all this into consideration, H. P. Grice summarises the observations in the following way: "Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged" and terms them *the cooperative principle* (CP) (Grice 1975: 45). The CP is further divided into four maxims.

The four maxims are quality, quantity, manner, and relevance. To begin with, the maxim of quality indicates that contributions in a conversation should always be true. Participants should not tell what they believe to be false or give information which lacks evidence. Next, the maxim of quantity requires that contributions should be as informative as necessary. The maxim of relation involves the observation that one conversation turn should be related to the previous one. Last but not least, H. P. Grice specifies the maxim of manner. This implies that speakers should express themselves with clarity and with order (Grice 1975: 45-46). However, maxims are not always observed.

There are situations when speakers do not behave according to the maxims of the CP. These may be instances of *violating, opting out, clashing,* or *flouting* maxims. The first, violating, involves the possibility of misleading the conversation partner. Opting out means that a person does not want to contribute to the exchange any more. Clashing involves a conflict between two maxims: for instance, sometimes it is necessary to say more (violating the maxim of quantity) in order not to violate the maxim of quality. Finally, a speaker flouts a maxim when he or she "may BLATANTLY fail to fulfil it" (Grice 1975: 49). Flouting a maxim leads to implicature, meaning that the speaker intends something other than what he or she says and the hearer has to discover the intended meaning of the utterance (Grice 1975: 49). This is often the case with metaphors or sarcasm.

The CP is an important concept in the context of this paper because (1) in the experiment, not only do speakers share a common communicative goal, but also an extra-linguistic one, and (2) there might be a mapping between the maxims and the interactive alignment model, most visibly in the maxim of manner, in which speakers try to be orderly and avoid ambiguity by opting for the use of related lexical items and structures.

9. Experiment

The sections below discuss the experiment's design, methods and procedure. What follows is an analysis and discussion of the results.

9.1. Participants

Ten native Polish speakers were divided into five pairs. Each participant worked with a different person from the group. The participants did not know who their interlocutor was because their names were encoded (either MP0XX or FP0XX for *Male Participant* and *Female Participant* respectively, with X standing for the number of the participant). All of the participants were in their mid-twenties and most of them were either currently enrolled at the university level or university graduates.

9.2. Procedure and design

The experiment involved 10 participants in pairs. The participants were seated in different rooms, each of them with their own computer. The participants of the experiment were given instructions for the experiment. Their task was to inform their interlocutor where a blue square, a green square and a red square were on a maze template. They also had to negotiate who was to start giving instructions and to ask for clarifications if they were unsure where a given square was. They were free to choose their own terminology for the description of the maze and the order of interaction was also free, i.e. either one participant could describe his or her maze at once and then ask the other participant to do so, or they could exchange their interaction. The task ended when both participants told the position of their squares and, if necessary, requested clarification. Having finished the task, the participants were supposed to say goodbye and disconnect

from the service. The whole interaction was conducted in Polish.

10. Analysis

The data collected during the experiment can be categorized into three prominent groups and a few instances which did not have a parallel representation in the corpus. The prominent groups include alignment of verb phrases, noun phrases, prepositional phrases and word order. The groups with lower representation in the corpus comprise information structure and morphology.

10.1. Verb phrases and complementation patterns

All types of priming were attested for verb phrases in the collected corpus. Although not instantly visible, alignment is evident upon closer inspection. This is clear in the first conversation where speaker MP001 displayed production-to-production priming; the utterances he produced had an alignment effect on FP001. Production-to-production priming was displayed by FP001, too. Alignment is visible here because of the inflection on the nouns, despite ellipsis of verb phrases by FP001. Examples of production-to-production priming and alignment:

> MP001: *ja mam dwa zamknięte pola: czerwone, które jest zamknięte na samej górze pierwszej kolumny od lewej*
> 'I have two locked fields: a red one-NOM, which is locked at the very top of the first column from the left'
> MP001: *oraz niebieskie, które jest zamknięte na samym dole czwartej kolumny od lewej*
> 'and a blue one-NOM, which is locked at the very bottom of the fourth column from the left'
> FP001: *u mnie, czerwone na dole drugiej kolumny od lewej*
> 'the red one (is) at the bottom of the second column from the left'
> FP001: *niebieskie sama góra piątej od lewej*
> 'the blue one (is at) the very top of the fifth from the left'

As the examples above demonstrate, FP001 used a major verb phrase ellipsis. Still, the speakers were able to communicate without any issues. Though verbs can be said to be complemented in the same way, MP001 uses a relative clause to provide the description of the position of the element of the maze. FP001 does not.

The other pair of participants provided a textbook example of alignment of verb phrases. Again, the verb phrase was ellipted. However, as in the example discussed above, the same verb was omitted, which is indicated by the form of the noun in the direct object.

> MP002: *Czwarta kolumna, piaty el. w tej kolumnie na samym dole.*
> 'Fourth column, the fifth element (is) in the same column at the very bottom'
> FP002: *5 kolumna od prawej, czwarty element na samej górze*
> 'The fifth column from the right, the fourth element (is) at the very top'

The examples above are also in line with the interactive alignment account since both speakers use the same verb, although ellipted. Both production-to-production and comprehension-to-production types of priming work towards alignment, since FP002 uses the input information to produce the output utterance. Interestingly, both speakers also fronted adverbials in their sentences.

Furthermore, alignment of verb phrases was also attested in prototypical adjacency pairs. FP003 produces a message of the shape S + VP + DO and FP004 acknowledges that she understands the message FP003 sent. The interactive alignment account assumes that from this local alignment a global one should result.

> FP003: *masz linię poziomą*
> 'you have a horizontal line'
> FP004: *no mam*
> 'I do, literally: I have'

The data in the corpus suggests that indeed local syntactic alignment resulted in a more global one, since sixteen turns later the same structure occurs and FP004 follows the same complementation pattern FP003 utilised earlier:

FP004: *to jak masz tą poziomą linię*
'so you have this horizontal line'

Another example which illustrates syntactic alignment is the case of using semantically related *to move/to go* verbs. Although superficially these two words in Polish seem different, they are semantically related. Additionally, the participants converged on the aspect and tense of the verb, too.

FP003: *od niej odchodzi 8 "korytarzy"*
'8 'corridors' go-IMPERF-PRESENT from it'
FP004: *to jak masz tą pozioma linie i druga pionowa od lewej, idzie tam sobie do dołu*
'so you have the horizontal line and the second vertical from the left goes-IMPERF-PRESENT to the bottom'

Generally, the inventory of verbs used by speakers in the experiment was quite limited; thus, different participants tended to use the same verbs the others did, despite not interacting with participants from other pairs.

FP005: *ja mam zielone pole po prawej stronie, tam gdzie sa 3 kwadraty*
'I have the green field on the right side, where there are 3 squares'
FP006: *czerwone mam z drugiej strony tzn w pierwszym "łańcuchu"*
'I have the red one from the other side, i.e. in the first "chain"'

As the example above indicates, the speakers aligned in terms of verb choice and therefore in terms of complementation pattern, too. Furthermore, both participants placed the adverbial optional in the final position. The distance between

turns in the example quoted above is 23, so it again shows how local priming leads to global alignment between speakers.

10.2. Noun phrases and morphology

The task the participants had to complete in the experiment required them to be specific in naming entities on the maze. It would seem that because of the requirement, participants would have converged on a single lexical choice and would have persisted with it. However, this was not always the case.

Participants FP002 and MP002, as the evidence indicates, implicitly decided to use the same name for the referent after FP002 explicitly negotiated the label with herself.

> FP002: *druga kolumna od prawej strony*
> 'the second column from the right side'
> FP002: *jest pierwszym z trzech elementów tej kolumny*
> '(it) is the first element of the three elements of this column'
> FP002: *czy rzędu jak to zwać - pierwszy pokój od góry*
> 'or a row, however you call it – the first room from the top'
> MP002: *Pierwsza kolumna, na samej górze pięciu el. tej kolumny.*
> 'The first column, at the very top of five elements of that column.'

Although FP002 suggests two terms to name one referent, MP002 takes up only one of them, namely *column*, probably because of the layout of the maze: *columns* are vertical whereas *rows* are horizontal.

Another pair of participants used the word *corridor* for their referents throughout the conversation. Despite being more remote from the context of the task than *rows* and *columns*, which are present on the list, this referent also allowed the participants to communicate efficiently.

> FP003: *Jeden korytarz jest i na dole i na górze tej linii*
> 'There is one corridor and at the bottom and at the top of the line'
> FP004: *czwarty korytarz od prawej*
> 'The fourth corridor from the right side'

Alignment between speakers also occurred when either of them used a pro-form instead of a full noun phrase in question-answer pairs.

> FP005: *gdzie masz zielone pole?*
> 'Where do you have the green field?'
> FP006: *zielone mam w pierwszym od prawej*
> 'I have the green (one) in the first from the right'

The reference here is successful because the most crucial information – the colour of the square – is provided by FP006. Furthermore, identifying the colour is the most recent and the most successful strategy of referring. Therefore, repeating the whole phrase is unnecessary and it allows the experiment's participants to save time.

Some speakers also employed another strategy to introduce a new term. In the pair with FP005 and FP006, a new term was introduced by using quotation marks.

> FP006: *zielone masz tam w drugiej "alejce" od prawej?*
> 'do you have the green (one) there in the second "alley" from the right?'
> FP005: *mam je po lewej stronie, druga alejka od lewej, na samym…*
> 'I have it on the left side, the second alley from the left, at the very…'

When the use becomes standardised, the quotation marks are dropped. The previous term might not have been as salient or informative as the new one, so it did not become a part of the shared lexicon (FP006 used the word *chain*). Furthermore, it was subject to provisionality; since *chain* did not provide a successful reference, it was replaced.

Pro-forms are also attested in cases when the first element of adjacency pairs does not have full verb phrase.

> FP007: *no to niebieski teraz jest na samym dole*
> 'so the blue (one) is now at the very bottom'

FP008: *niebieski mam w czwartym*
'I have the blue (one) in the fourth'

The reason for that situation is the fact that it is the most recent term with a successful reference. Furthermore, it carries enough information that both speakers understand each other.

Apart from the aforementioned inflectional morphemes, which also provide information about the ellipted verb, there were suffixes which changed the emotional load of words. The most prominent example of these are diminutives of greetings.

FP004: *Siemka*
'Hi-DIM'
FP003: *hejka*
'hello-DIM'

These examples show the levels at which priming can be said to function. In other cases, diminutives were not used and speakers greeted each other in a more standard manner.

10.3. Prepositional phrases

In contrast to noun phrases and verb phrases, participants used a more limited array of prepositions. The reasons for this will become clear upon a closer inspection of examples from the corpus. The prepositions used by participants varied depending on the way they conceptualised the maze. They were subject to both provisionality and speaker-specificity.

The first example shows two speakers who did not align their representations and their conceptualisations of the maze were different. Thus, nearly every utterance MP002 produced was followed by a clarification request.

FP002: *druga kolumna od prawej strony*
'The second column from the right side'
MP002: *Pierwsza kolumna, na samej górze pięciu el. tej kolumny.*
'The first column, at the very top of five elements of the column'

    MP002: *Ósmy rząd, pierwszy u góry*
    'The eighth row, the first one at the top'
    FP002: *ósmy od lewej?*
    'The eighth one from the left side?'

Here, FP002 uses the structure *number of columns* + *from the left/right side*. MP002 does not. He numbered the rows from 1 to 8 from left side and provided instructions in this fashion. Hence, one might infer that the two speakers had quite different conceptualisations of the maze.

    Another fact attested by the corpus is the use of emphatic structures. Significantly, their use was one of the most popular means to indicate the position of a coloured square on the maze across all pairs.

    FP002: *drugi rząd od lewej, na samym dole z trzech elementów*
    'the second row from the left side, at the very bottom of three elements'
    MP002: *Pierwsza kolumna, na samej górze pięciu el. tej kolumny.*
    'The first column, at the very bottom of five elements of this column.'

    FP005: *na samej górze*
    'at the very top'
    FP006: *na samym dole*
    'at the very bottom'

What this might indicate is the fact that speakers conceptualised the maze in terms of vertical position in the same way. This is supported by the FP002 MP002 pair where, despite not having aligned representations in terms of counting the columns, they did align in terms of describing the vertical position of elements on the maze.

    Another example involves the alignment of verbs, complementation pattern, but with a different preposition. Both sentences can be represented by the following pattern: S + V + Adverbial Optional. However, the preposition which indicates the direction is different.

FP003: *idzie tam sobie do dołu*
'it goes towards the bottom'
FP004: *idzie w dół*
'it goes to the bottom'

Such a situation may result from both prepositions belonging to the same semantic class: they denote direction/goal. Hence, despite the superficial lack of alignment in linguistic terms, the speakers in the pair do have their linguistic representations aligned.

10.4. Information structures

Some evidence obtained in the experiment suggests that speakers may also align the way they represent information structures in their utterances. In general, two strategies can be discerned in the corpus. The first fronts the green/red/blue field and then states its location or first states the location and then says which element the participant was describing. However, the order of presenting information is not stable across pairs. The first two examples support the alignment of theme-rheme in conversation.

MP002:   *Czwarta kolumna, piaty el. w tej kolumnie na samym dole.*
'The fourth column, the fifth element in this column at the very bottom.'
FP002: *5 kolumna od prawej, czwarty element na samej górze*
'The fifth column from the right, the fourth element at the very top.'

FP009: *moj zielony punkt jest po prawej stronie, pierwszy rząd*
'my green point is at the right side, the first row'
FP010: *mój zielony punkt jest po prawej, trzeci rząd od prawej*
'my green point is at the right side, third row from the right'

In the first case, the first element provided pertains to new information, the knowledge of which the speakers do not

share: only one of them knows where the element is. Only after that do they present given information, which is known to their interlocutor, i.e. they mention the green element. In the second pair, on the other hand, the information about the green element is fronted.

The fact that the order of presenting information is not stable across pairs, but is within a single conversation, may hardly be surprising since the interactive alignment model provides an explanation for this phenomenon. The model assumes that in each encounter, the speakers build new conventions for conversations, which are fortified by the priming mechanism. Here, a specific kind of information structure as a whole is used by the first speaker. Thus, the first speaker primes himself/herself to reuse this structure. By uttering the sentence using this pattern, s/he influences the other speaker's utterance: the comprehension-to-production priming is activated. These two processes lead to the alignment of situation models of the two speakers.

However, there were also some examples where alignment of the whole sentence was not reached initially and the way the information was presented differed within a pair.

> FP003: *to czerwone jest na samej górze*
> 'The red one is at the very top'
> FP004: *i to na samym dole w drugiej po lewej to czerwone*
> 'and at the very bottom in the second one to the left (is) the red one'

Yet, later on the speakers converged on the same word order in the sentence. The reason for that may be that the individual units (such as prepositional phrases and lexemes) are the same; hence, the alignment of word order in utterances is easy to establish.

> FP003: *niebieski kwadracik: czwarty korytarz od lewej idzie w dół to na końcu jest niebieski kwadracik*
> 'the blue square: the fourth corridor from the left goes down and at the end there is a blue square'

FP004: *to teraz niebieski kwadracik u mnie: czwarty korytarz od prawej, na samej górze.*
'so now my blue square: the fourth corridor from the right, at the very top'

In this case, interlocutors aligned the word order of their sentences after some time. This, as mentioned above, was aided because they shared atomic linguistic information.

11. Discussion

The alignment of situation models and linguistic representations via a priming mechanism is evident in the data obtained from the corpus. The repeated use of the verb phrase, even in relative clauses, primed the interlocutor to use the same verb and typically the same complementation pattern. This is also clear in situations where verb phrases were completely ellipted, since the element that followed was declined in a way that indicated the use of the same verb. The use of verbs which have the same root but are different in terms of aspect and tense, but are complemented in the same way (in the case of the corpus with a prepositional phrase) was also attested. This means that a verbatim repetition of verbs may not be necessary in order to reach an alignment because it is enough that the verbs used by speakers are semantically related to a sufficient degree, as it is with the case described above. Similarly, it is possible for prepositions to only belong to the same class so that speakers can align their representations.

The collected data also may suggest that a total alignment of word order is either triggered at the very beginning of a conversation or takes some time to be established. It was shown in the previous section that some pairs of speakers structured the sentences, and hence the order in which they conveyed information, in the same way. However, others initially did not and it took them some time to do so. The fact that in either case, all speakers applied the same order may mean that

structuring information in the same way facilitates conveying information.

The role of sharing linguistic representations and thus aligning situation models is evident in the exchange between FP002 and MP002. MP002 conceptualised the maze as one consisting of columns numbered from left to right and from 1 to 8. FP002, in contrast, conceptualised the maze as having two sides. Typically the participant first provided the side she was counting from and then the number of columns from the given side. As a result, MP002 and FP002 may not be said to have conceptualised the maze in the same way. This is also clear from the number of clarifications FP002 produced.

However, other participants of the experiment aligned their representations at a deeper level, which is substantiated by the fact that they used the same prepositional phrases (or prepositional phrases whose heads are semantically related). The use of the same prepositions to explain spatial relations between elements on a map indicates that the participants conceptualised the maze in the same way.

Another important fact pertains to information structure. It suggests that speakers do not only align their low-level linguistic representations, but that their alignment may also occur at a higher grammatical level. Choosing the given/new information structure strategy may also be a coping strategy that participants used in order to overcome the limitations of the medium and make their instructions easier to follow. However, since the corpus attests both given/new and new/given information structures, studies aimed specifically at this issue should be conducted to provide a final answer.

Lexical pacts emerged in pairs. Here, what must be emphasised is the role of priming in the alignment of lexis. Typically interlocutors converged on the same lexemes because they used the information they received in the input in order to produce the output. Sometimes amendments were suggested, such as the strategy with quotation marks discussed in the analysis, and if they were taken up, interlocutors used them throughout the conversation. In cases where one speaker was

inventive with terms, the conversations were much longer than in situations with a more limited inventory of lexemes.

The fact that the participants shared a common goal might have translated into the fact that they used the same structures, the same lexemes, and the same information structure. This linguistic behaviour may be in line with observing Grice's maxim of manner. By aligning the elements mentioned above, speakers maximise their orderliness and brevity while minimising the ambiguity and obscurity of their contributions.

12. Conclusions

The aim of the experiment was to collect data from CMC conversations in Polish and to use it in order to test Pickering and Garrod's interactive alignment account. The data corroborated, to a degree, assumptions made in the model. Importantly, the link between the different levels of alignment was substantiated in the way that repetitive use of a verb (level of lexemes) led to the alignment of word order (level of syntax), and that there is a direct link between linguistic representation and representation of situation models: in a case where the former was different, updating the situation model required using explicit common ground. Furthermore, the importance of sharing the same linguistic expressions in order to have a successful conversation was also corroborated: the more items shared, the shorter the conversation. Finally, the fact that priming is the basic mechanism leading to alignment, as exemplified in the data from the corpus, was also corroborated.

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