Enthymematic reasoning in a moral dilemma – do patients with schizophrenia reason differently?

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1 Introduction

It is well known that world knowledge plays an important part in our understanding of pragmatic phenomena that are crucial for our ability to interact successfully with other human beings. A perspective on how world knowledge becomes relevant and even necessary in conversation and other types of discourse is the *micro-rhetorical* perspective presented and formally modelled using Type Theory with Racords (TTR) in Breitholtz (2014). According to this approach, discourse is to a great extent made up of common sense-, or *enthymematic*, arguments. These arguments are underpinned by *topoi*, principles according to which it is acceptable to reason in a particular social group or a particular context. When we interact we expect topoi to be common ground, or we are explicit enough in the argumentative structure of our dialogue contributions to make sure that our dialogue partner accommodates the relevant topoi. In (1) for example, speaker *A* believes that the topos "if a route is shorter, it is preferable" or similar is in common ground, and this is why (1b) is a good reason to motivate choosing Walnut Street over other available routes.

(1) a. *A*: Let's walk along Walnut Street.

b. *A*: It's shorter.

One important property of topoi as opposed to, for example, the rules of a non-monotonic logic, is that one individual may entertain several topoi leading to different conclusions in any given context. This is also an important feature of human reasoning – we may fully and correctly interpret the arguments of our interlocutors and make them part of common ground even if we do not agree with them.

Many different aspects of communicative difficulties in patients with schizophrenia have been hypothesised. For example, patients with schizophrenia may have difficulty monitoring their own verbal behaviour (Johns et al., 2001) and also display difficulty understanding and interpreting figurative language or metaphor and inferring other's mental states (Gavilán and García-Albea, 2011). Studies have also found that patients display differences in the way they reason in a number of decision making and logical reasoning tasks. However, perhaps surprisingly, these show no evidence of a general reasoning difference but only of subtle specific differences, for example, a tendency to jump to conclusions in the patient groups (see Dudley and Over, 2003, for a review). We hypothesise that this tendency is related to a difference in the sets of topoi that are available to patients and non-patients.

However, most of this work relies on testing individuals and fails to take interaction into account. Recent work (Lavelle et al., 2012) shows that in interactions involving patients with schizophrenia, while patients non-verbal communicative behaviour is different to that of healthy participants, their interlocutors also adapt their non-verbal behaviours, despite being unaware they were interacting with a patient. In this paper we will investigate whether this is also true for linguistic behaviour, by investigating the reasoning involved in dialogues which include a patient diagnosed with schizophrenia and dialogues between healthy controls. We are interested in the way particular topoi are drawn on, and which assumptions underpin the enthymematic arguments made.

2 Method

Data The data used for this exploratory study are a subset of the transcriptions of video recorded face-to-face dialogues from 19 patient (1 patient, 2 healthy participants) and 18 control (3 healthy participants) interactions reported in Lavelle et al. (2012).

Task Participants discussed the *balloon task* – an ethical dilemma requiring agreement on which of four passengers should be thrown out of a hot air balloon that will crash, killing all the passengers, if one is not sacrificed. The choice is between a scientist, who believes he is on the brink of discovering a cure for cancer; a teacher who is 7 months pregnant; her husband, the pilot; and a nine-year old child prodigy who is considered

to be a twenty-first century Mozart. This task has been used for studying many aspects of dialogue, and is known to stimulate discussion (Howes et al., 2011).

Annotations Following Breitholtz and Howes (2015), 5 control dialogues and 5 patient dialogues were annotated for turns containing arguments regarding who to save and who to throw out of the balloon.

3 Results and discussion

As can be seen from Table 1, patients come up with fewer arguments regarding who to throw out of the balloon (mean 3.2 per person, compared with 8.0 per person in the control groups; $t_{18} = 2.84, p = 0.01$). However, patients also make fewer dialogue contributions (188.4 vs 430.7 words $t_{13} = 2.11, p = 0.05$). Numerically, control participants in dialogues with a patient come up with fewer arguments than those in dialogues without a patient, suggesting that controls interacting with patients also moderate their reasoning behaviour, in line with the non-verbal findings from Lavelle et al. (2012) though this is not statistically significant given the small sample size. Further research is needed to validate this result.

	Control	Patient groups			Total
	groups	Controls	Patients	Total	
Conversations	5			5	10
Participants	15	10	5	15	30
Turns per person	42.8	40.3	27.8	36.1	39.5
Words per person	408.2	430.7	188.4	349.9	379.1
Arguments per person	8.0	6.7	3.2	5.5	6.8
Arguments per turn	0.187	0.166	0.115	0.153	0.171

Table 1: Overview of annotated data

Qualitative analysis of the data indicates that patients' reasoning is less likely to change over the course of a conversation, as shown in (2), despite 200 intervening turns and a number of different arguments put forward by the patient's interlocutors.

(2) 4: but I'm gonna say that I would go for <unclear> Sue 'cause like she's got her baby so is extra weight

209: I'd still go with Sue though you know what I mean she's carrying extra weight like

This exploratory study shows that the way in which patients with schizophrenia access and use enthymematic arguments in dialogue may be different from the ways in which healthy participants do, and suggests many promising avenues of future research. Specifically, by taking the taxonomy of balloon task arguments from Breitholtz and Howes (2015) we will investigate whether patients use different underlying topoi to their interlocutors, or are less able to entertain conflicting topoi, and also how their interlocutors adapt their own chains of reasoning due to the presence of a patient in the dialogue. A game board semantics including enthymemes and topoi modeled in TTR, as presented in Breitholtz (2014), gives us a way to formally model these differences.

References

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