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Differential Pragmatic Abilities and Autism Spectrum Disorders:
The Case of Pragmatic Determinants of Literal Content[1]

Jessica de Villiers, Brooke Myers and Robert J. Stainton

Abstract

One of the defining characteristics of autism spectrum disorders (ASD) is impairment in language and communication. Individuals on the autism spectrum are often characterized as having difficulty with pragmatics. Pragmatic competencies can pertain to either non-literal or literal content. This paper explores quantitatively the degrees of difficulty among various pragmatic determinants of literal content in conversation samples of 12 youths with ASD. While exploring these pragmatic competencies, the researchers describe a methodology for assessing literal pragmatic competencies in this population with audiotaped, transcribed data. This chapter provides preliminary evidence that suggests individuals with ASD have more difficulty properly using certain pragmatic determinants of literal content. Methodological limits of this study and future research are discussed.

I. Introduction

It has become something of a truism that people with Autism Spectrum Disorders (ASD) have difficulties with pragmatics. Granting this, however, it is important to keep in mind that there are numerous kinds of pragmatic ability. One very important divide lies between those pragmatic competences which pertain to non-literal contents – as in, for instance, metaphor, irony and Gricean conversational implicatures – and those which pertain to the literal contents of speech acts. It is against this backdrop that our question arises: *Are certain pragmatic tasks more difficult than others for people with ASD*?

To address this question, we proceed in stages. First, we explain and situate our question. Next, we tentatively argue for a positive answer. Having very briefly reviewed the results of a prior paper (de Villiers, Stainton and Szatmari 2007b) – which proposed that, among speakers with ASD, non-literal pragmatics may indeed lie higher on the scale of difficulty – we present some suggestive results from a more detailed, quantitative analysis of the same corpus. Our preliminary conclusion will be that there are degrees of difficulty even among the sub-varieties

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[1] The results presented here form part of a joint project with Dr. Peter Szatmari. We wish to recognize his on-going help and guidance. Earlier drafts were presented at: the Second Conference on Utterance Interpretation and Cognitive Models at Université Libre de Bruxelles; the First North American Workshop on Pragmatics at Glendon College; the Instituto de Investigaciones Filosóficas at UNAM; the Western Interdisciplinary Student Symposium on Language Research at The University of Western Ontario; the Kline Workshop at University of Missouri-Columbia; and the Canadian Philosophical Association. We are very grateful to the participants for valuable feedback. Special thanks to: Nicholas Asher, Robin Carston, Lenny Clapp, Herb Clark, Ray Elugardo, Philip Robbins, and Catherine Wearing. We gratefully acknowledge financial assistance from the Social Sciences and Humanities Research Council of Canada and from the Canadian Institutes of Health Research.

of pragmatically-determined literal content. Finally, we will highlight some methodological lessons about annotating pragmatic errors in a corpus: in general, this turns out to be a subtle and tricky process; in particular, we have learned that uncovering "pragmatic errors" using only a transcription of recorded conversation is rather harder in some cases than in others. Several means of overcoming these limitations are proposed.

II. Explaining the Question

To explain our main question, we need to explore in more detail the varieties of pragmatic abilities that will be our focus. We will also need to rehearse, albeit very briefly, the core deficits associated with ASD.

Let us begin with a terminological caveat. It is essential for our purposes that 'pragmatic' not be understood as implying non-standard usage. Construing the term this way is a tempting mistake because, historically, the most familiar cases in which pragmatics plays a role have been of the non-literal kind. Recall, for instance, Grice's (1975, p. 33) famous case of a letter of reference for a philosophy student which reads only "Dear Sir, Mr. X's command of English is excellent, and his attendance at tutorials has been regular". The letter writer conversationally implicates that Mr. X is not good at philosophy. Importantly, this is not part of what is literally stated or asserted. Or again, someone who utters "That was a great presentation!" about an obviously awful talk conveys that she found it awful; but she does not assert this. Metaphor and sarcasm provide additional familiar examples of non-literal meaning. The temptation to read "pragmatic" as entailing non-literal is fostered as well by an equivocation on its antonym "semantic". In one usage, semantic content just refers to the literal truth conditions of the speech act. In this usage, it seems true by definition that the pragmatic – being defined as *extra*-semantic – is *ipso facto* "figurative". In another usage, however, "semantic" pertains to standing expression meaning. The latter is our preferred sense of the term. In psychological terms, semantic content is the meaning assigned by knowledge of language alone.

So defined, it is an empirical question whether semantics can deliver what is strictly speaking stated, asked or ordered. What is more, once the terminological confusions are set aside, it becomes obvious that there are many cases of pragmatic determinants of literal content. That is to say, there are cases in which non-linguistic knowledge and abilities – knowledge about people and the world in general, knowledge about the specific context, and perceptual and inferential abilities of various sorts – play a role in the production and comprehension of wholly literal talk.

Examples noticed early on (Frege, 1919) include disambiguation and reference assignment to overtly context-sensitive expressions. Take an utterance of 'That is our pen" by Juancito. What he states, in so speaking, depends upon the referent of 'that' and 'our' in the context; it also depends upon which meaning of the ambiguous 'pen' is at issue. Although this is not universally accepted (see, e.g., Stanley, 2000), most pragmaticians agree that facts about the non-linguistic context come into play yet again, in rather different ways, in fixing the literal content of the utterance. Continuing with Juancito's 'That is our pen', even once 'pen' has been disambiguated between WRITING INSTRUMENT and HOLDING AREA, the specific sense needs to be narrowed down: e.g., did Juancito mean that this very writing instrument token belongs to the

relevant group, or just that they (collectively) have a token of that type? This is resolution of *polysemy*.[2]

In a related vein, the specific relationship that Juancito meant by 'our' is not encoded: is it the writing instrument that he and his fellows own, that they intend to purchase, that they manufacture, etc.? This is an example of precisifying the content of a *grammatical possessive*.[3]

The literature is by now replete with sub-varieties of pragmatic determinants of literal speech act content.[4] Our study focused on eight of these sub-varieties listed below. We will explain them, with examples from our corpus, later on.

A) *Contextually salient entity/property being discussed*
- i) Indexical pronouns and demonstratives
- ii) Sub-sentences
- iii) Null complements
- iv) Possessives

B) *Unspoken domain or comparison class*
- i) Quantifier domain restriction
- ii) Degree on a scale

C) *Sense determination*
- i) Homophony
- ii) Polysemy

To understand our main question, it remains to introduce Autism Spectrum Disorders (ASD). It goes without saying that, for reasons of space, we are simplifying. ASD is characterized by, among other things, difficulties in three related areas: socialization and social interaction; restrictive or repetitive patterns of behaviour; and language and communication.

With respect to socialization and social interaction, people with ASD have noted difficulty with "mind reading", including failure or at least trouble with false belief tasks. Related to these difficulties are difficulties with joint attention and poor eye contact and gaze. Their social skills are sometimes characterized as "robot-like", and in severe cases individuals affected may treat parts of people as objects and inanimate instruments. People with ASD may exhibit stereotypical behavior or movements, and circumscribed interests. Related to this, children diagnosed with ASD have a tendency to not engage in spontaneous pretend play. Indeed, they have trouble with the appearance/reality distinction. Novelty can be unwelcome, with resistance to changing routines or unfamiliar surroundings – familiar rituals, even when nonfunctional, are preferred. Finally, and of most direct relevance to our question, people with ASD often demonstrate deficits in language and communication. To begin with, language acquisition tends to be delayed (except

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[2] Another example of type/token polysemy: in the context of the question "What kind of car do you drive?", consider what might be stated with "That is my car".

[3] Compare also "Rob's portrait": the portrait of him, drawn by him, owned by him?

[4] For discussion and numerous examples, see Bach (1994a, 1994b, 2001), Borg (2004), Carston (1988, 2002), Récanati (2001, 2002, 2004), Searle (1978, 1980), Sperber and Wilson (1986) and Stainton (2006).

in Asperger's syndrome). Indeed, half of the people diagnosed with ASD never acquire fluent speech. But, as we noted at the outset, even after successful acquisition of language, problems remain. Symptoms which seem more properly linguistic include echolalia (both immediate and delayed imitation of speech heard elsewhere), pronoun reversal, idiosyncratic lexical meanings, flat inflection, and violation of turn-taking and other informal rules governing roles in dialogue. On the more communicative end, the speech of people with ASD may be inappropriately formal, and characterized by a marked reduction of cohesion and coherence in discourse. Extra-linguistic cues may be absent: even when they would be useful to compensate for limited speech abilities, gestures, facial expressions and ostensive pointing may be lacking. Spontaneous linguistic interaction is limited, with a notable lack of freely-asked questions or answers (especially those WH questions that do not have one word answers). When speech does occur, it often contains stereotypes and perseveration on a single topic. Finally, when interpreting, people with ASD may not project themselves into the speaker's point of view; and when speaking, they may not anticipate what hearers will understand or want to know. As a result, we find violations of Grice's (1975) conversational maxims, including, in particular, saying things that manifestly lack relevance to the hearer(s). Related to this, speakers and hearers with ASD demonstrate literalism: they have notorious trouble with figurative expressions (metaphor, sarcasm, irony).[5]

III. Study Design

In a recent article de Villiers, Stainton and Szatmari (2007b) argue that "literal pragmatic processes" can be partially dissociated from non-literal ones. Though far from perfect, when it comes to pragmatic determinants of literal content, the production of ASD participants was quite good as compared to the population-wide difficulties with non-literal language (e.g. in metaphor and conversational implicature). In particular, participants were noticeably good at (A i-iv), (B i-ii) and (C i-ii).[6] This already suggested a positive answer to our main question: certain pragmatic tasks are indeed easier for people with ASD. More strikingly, there seemed to be degrees of difficulty *within* the eight sub-varieties that we focused upon. This finding is what has motivated the present study: to explore quantitatively the degrees of difficulty among the various pragmatic determinants of literal content.

Audiotaped, semi-structured conversational data was collected from 12 youths diagnosed with ASD as part of a conversation skills study. Participants were part of a follow-up study of children diagnosed with ASD and were first selected at ages 4-6 when coming in for assessment or treatment at one of six centers serving preschool children with developmental disorders in southern Ontario. In the follow-up study, participants were ages 10-16, and all had fluent language skills in that they were verbal and could speak in sentences. To ensure sufficient

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[5] This list is compiled from Asperger (1944), Baltaxe (1977), Baron-Cohen (1995), de Villiers and Szatmari (2004), Fine, Bartolucci, Szatmari and Ginsberg (1994) and Frith (2003). See Asp and de Villiers (2010), Cummings (2009) and de Villiers et al. (2007b) for further details.

[6] In that study, de Villiers et al. (2007b) did not address within-speaker variation: they uncovered a population-wide ability that contrasts with a previously known population-wide disability. This methodological limitation is overcome in some of Francesca Happé's work: she studied individual speakers/hearers with ASD, and found them to be fairly competent with indexicals and the like, though unable to handle metaphors. See especially Happé (1993, 1995).

language ability for conversation to be possible, those participants diagnosed with autism had to have a score above 5 in McCarthy's (1972) oral vocabulary test, a psychometric test which assesses a child's ability in expressive language. The semi-structured conversations with a researcher took place in the child or youth's home and covered some common topics including school and family life.

These conversations were transcribed and the resulting written corpus provided the data for our first paper: it afforded many examples in which our participants succeeded pragmatically. This afforded a sort of "possibility proof" for pragmatic abilities in ASD with respect to fixing literal content. For the present study, transcripts of these conversations were annotated for the eight sub-varieties of pragmatic determinants of literal speech act content listed above. For each individual speech act, the coder determined whether it involved any of (A)-(C), and if so which one(s). At the same time, the corpus was coded for errors. Three kinds were identified:

i) a grammatical problem in the construction;
ii) a breakdown in communication, often signaled by a request for clarification or a repair in the discourse (e.g., 'you mean *get a haircut*?');
iii) a failure by the speaker to anticipate the hearer's needs (as inferred by the coder).

Grammatical errors will not be our focus here, and category (ii) is familiar enough. Category (iii), however, merits special attention, in two respects. First, two sub-varieties are especially salient: (a) the person with ASD paying insufficient attention to information (not) available to the hearer in the specific speech context, and (b) linguistic abbreviation so drastic as to not provide enough decoding type clues to allow the hearer readily to recover the intended content. Second, it is worth stressing that these are instances where the *coder* had difficulty interpreting the message, on the basis of the speech of the participant with ASD plus the larger context. In those cases she could not determine it at all; she could only make an educated guess about what might have been meant; or she could eventually establish with some certainty the speaker's meaning, but only after undue effort. In any of these cases, it is likely that the *researcher/interlocutor* would have had serious difficulty interpreting the discourse: he or she had available, for the most part, the same information and linguistic signal as the coder. Indeed, the interlocutor's situation was often worse, since he or she had less time to process that signal. Furthermore, since the two participants in the conversations did not know each other well, there was also relatively little advantage in terms of shared common ground. Now, insofar as failing to make one's talk readily understandable is *ipso facto* a conversational mistake, the coder would, in such cases, conclude that, very likely, the speech act involved a pragmatic error on the part of the speaker with ASD. The conclusion must remain "very likely" because sometimes the interlocutor will have had information unavailable to the coder, information which the speaker with an ASD could have been relying upon.

Coding an error in this way is risky. Thus, it may reasonably be asked why repairs and corrections were not used as the sole indicator of errors in the deployment of (A i-iv), (B i-ii) and (C i-ii). The answer is that in the context of research interviewers, there is strong anecdotal evidence that interlocutors often ignore pragmatic errors on the part of speakers with ASD, in order to keep the conversation flowing. Thus, in this kind of text, the lack of correction and repair is not a good indicator of pragmatic success.

IV. Coding Criteria

We now present, in detail and with examples, our coding criteria for each of the eight subvarieties. We have simplified the examples below, by highlighting one pragmatic determinant of literal content per speech act. In the actual corpus, however, we find many utterances where more than one of (A)-(C) appear. For instance, a grammatical possessive may have an indexical in it: 'that man's dog'. In this case the phrase would count as an indexical and also as a possessive.

A i) *Indexical Pronouns and Demonstratives*

These are coded when the speaker uses an expression of the designated kind (e.g., 'this', 'that', 'these', 'those', 'he', 'she', 'his', 'her', 'I', 'here', 'now', 'today', 'tomorrow') in a deictic way – that is, in a context where the hearer is expected to understand who/what is being referred to. Not all context-sensitive referring terms were counted as indexicals/demonstratives. In particular, we did not code the following: definite NPs where the listener could easily determine the contextually-salient referent (e.g., 'the house', 'the boy', 'the shoe'); quantifier phrases, even where the speaker was likely referring to a salient group (e.g., 'everybody' and 'all the animals'); context-dependent referring quasi-names such as 'grandma' or 'Mr. President'.

Incorrect use of indexicality is evident when the listener cannot readily discover the referent. Compare a correct usage in (1), with an incorrect usage in (2):

1. A: Those guys are a blast!
B: Yeah, they are really funny!
2. A: Those guys are a blast!
B: Yeah, ***he** is really funny!

Example errors from our corpus appear below in (3) and (4). In (3), a repair, the topic is staying in a hotel. In this example, the reference is problematic in that it is unclear to the researcher who "they" refers to. In (4), a case of inferred error, the topic is the movie star Kevin Costner. In this example, the pronominal reference "it" suggests the participant incorrectly presumes that the researcher will understand which Kevin Costner movie he is referring to.

3. Researcher: so you're staying with some friends here while you're in Toronto eh?
Participant: yes.
Researcher: mmhm?
Researcher: that must be nice not to have to stay in a hotel.
Participant: I I I want to.
Participant: but it seems that they did ***they** didn't agree.
Researcher: who didn't agree?
Participant: mom and dad.[7]

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[7] Transcription Conventions:
-: syllable lengthened
[>] overlaps with following text
[<] overlaps with preceding text
pause

4. Researcher: what's your favorite one you've seen with him?
Participant: no.
Participant: I haven't really seen much o(f) him in ***it**.

A ii) *Sub-sentences*
These are coded when a speaker could have found a complete sentence to convey his/her complete thought, but uses a mere word or phrase instead. That is, the speech act's *content* is of an ordinary statement or question; but the *form* used is less than a sentence. Importantly, a sub-sentence is not coded in cases of obvious syntactic ellipsis. A crucial test here is how difficult it would be to reconstruct precisely the "missing constituents" that would be required to expand the word/phrase into a sentence: in genuine syntactic ellipsis, this is straightforward; in sub-sentential speech, there is indeterminacy with respect to the "omitted" material.

Obvious examples of sub-sentential speech acts include 'fire!' as yelled in a theater or 'ditto' used to echo a previous claim. To give a more extended example: Suppose a woman walks by her apartment with a friend, and hears a dog barking. If she looks up and says 'Maya!' and shakes her head, meaning thereby something about Maya's barking being annoying, this would be an example of a sub-sentence. The intended meaning behind this "one-word sentence" cannot be retrieved by filling in obviously omitted words, as it could in the case of genuine syntactic ellipsis. (Compare a case in which the woman says 'Maya' in response to the direct question 'Which dog is barking loudly?' Here it is easy enough to construct a sentence: 'Maya is barking loudly'. For extended discussion of the contrast between syntactic ellipsis and genuine sub-sentential speech acts, see Stainton (2006).)

Sub-sentence errors are identified in one of the two ways noted above: the usage leads to repair by the interlocutor, or the coder finds it difficult to understand the speech act, and infers that it would have been unduly difficult for the interlocutor to recover the meaning. Example errors from our corpus appear in (5)-(7) below:

5. Researcher: who's in your family?
Participant: hm I don't know.
Researcher: are there five of you?
Participant: yes.
Participant: ***my cat**

6. Researcher: which one did you work in?
Researcher: which Burger King?
Participant: the the Oshawa mall um down um oh down that street where the car dealership is.
Participant: yeah down there.
Researcher: <ah> [>].
Participant: <or> [<] ***Consumers Distributing**.

7. Participant: de I can't wait to go to # places I gonna see like going to New York and -: um or going t or and the United States.

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xxx undecipherable
[?] uncertain

Participant: going to the reference library.
Researcher: uhhuh?
Participant: ***holiday**.
Participant: and even I can't wait for going to camp too.

A iii) *Null Complements*
These are coded when there is no phonologically realized complement in a phrase, despite the fact that its head usually semantically selects one. For example, this includes uses of transitive verbs where a direct object is implied but not expressed. Null complement cases do not include, of course, intransitive verbs that occur without an object, as in 'He slept'. (See Iten, Junker, Pyke, Stainton and Wearing, 2005 for introductory discussion.) Illustrations of this sub-variety of pragmatic determinants of literal content appear in (8)-(11).

8. Mary won (*Won what?*)
9. Steve arrived (*Arrived where?*)
10. Thanks but I have two (*Two of what?*)
11. I went to my Nana's (*Nana's what?*)

An error is indicated by a repair in (12). Numerous examples of inferred error appear in (13)-(15).

12. Researcher: Do you have a sister?
Participant: Yes and she **won**!
Researcher: What did she win?

13. Researcher: you were showing me your iguanas.
Researcher: what can you tell me about them?
Participant: one escaped for two day -: .
Participant: and one # and uh he started <not to he ate> [?].
Participant: but he n not very much.
Researcher: where did you find him.
Participant: behind the piano.
Researcher: and was he difficult to catch again?
Participant: mmhm.
Participant: but uh I ***wasn't**.
Participant: and uh my mom she hired somebody to help her do some stuff around the house.
Participant: and uh they had to do it.
Participant: and one was holdin(g) it like like this.
Participant: and uh the person that was holdin(g) it was terrified of them.

14. Participant: and w there was one cool part when it the whole body grew back from one arm.
Researcher: that would be really nice to see it.
Participant: mmhm.
Participant: like the whole like the brain forming.
Participant: and then the skull forming out of off of the brain.

Researcher: mmhm.
Participant: and then the jaw forming.
Participant: and then the # everything forming from inside.
Participant: and *__going out__.
Participant: eh unti until he w he was *__finished__.
Participant: and he arrived <barebuck naked> [?].
Researcher: hm.

15. Researcher: do you get an allowance?
Participant: not really.
Researcher: not really?
Researcher: just some money <xxx> [>]?
Participant: <maybe> [<] at the end of the month.
Researcher: yeah.
Participant: I'm *__starting__
Researcher: oh yeah.
Researcher: sounds good.
Researcher: are there any subjects that you really don't like?
Participant: well -: there's one subject I had I did bad on.
Participant: that was health.
Researcher: health?
Participant: I got a C.

A iv) *Possessives*
This relation is coded with any grammatical possessive such that the relation between the possessor and his/her possession cannot be merely decoded, but must rather be pragmatically filled in on the basis of real world knowledge and context-based inference. Recalling an earlier example, "Rob's portrait" can be used to speak literally of a portrait of Rob, a portrait drawn by him, one owned by him, etc.

Pragmatically incorrect use of the possessive was very rarely coded in our sample. There are two possible explanations of this. It may be that our participants with ASD are especially able with respect to the pragmatics of possessives. Another explanation, however, is that the so called "scarcity of errors" is really an artifact of our coding techniques: when the conversation is transcribed, and studied after the fact on the basis of a mere transcript, (A iv) may be a sub-variety in which it is especially hard to notice errors. One can certainly imagine detecting them. For instance, it could be apparent from the transcript that the interlocutors are thinking of different possessive relations, as in the invented example (16).

16. A: That is *__Bob's__ car.
B: How did he afford it?
A: I mean it's his parent's car.

But spotting errors without such explicit correction/repair may be especially difficult. We will return to this issue in Section VI below.

B i) *Quantifier Domain Restriction*
This refers to utterances where the speaker has a specific domain in mind, which he/she intends the listener to pick up on via the context at hand. (Here, context refers to situational or cultural knowledge available to interlocutors.) Subtypes include an implicit group, an implicit time period, or an implicit location, as in (17)-(18), (19)-(21) and (22)-(23) respectively:

17. Everybody got really drunk (*Everyone at the party*)
18. No one even understood the test (*No student*)
19. Did you turn off the stove? (*Before we left the house*)
20. I have already had breakfast (*This morning*)
21. I have already seen *Star Wars* (*In my lifetime*)
22. Dogs are not allowed (*In this building*)
23. Is there any chicken salad? (*For sale in this restaurant*)

Proper use of domain restriction occurs when the listener can easily recognize the particular domain that the speaker is referring to, and interpret the speech act accordingly. The incorrect use of domain restriction is coded in the usual way: when there is an obvious misunderstanding, followed by a repair (e.g. "No, I meant…"); or when, as in (24), the coder infers that the interlocutor could not readily determine or be confident about the domain that the speaker meant. In the case of (24), the participant explains how to make Kraft Dinner and concludes "that's all", which is problematic because really that is not all one needs to make Kraft Dinner. If the researcher had never heard of Kraft Dinner before, and followed these instructions literally, the researcher would end up with melted cheese in water instead of Kraft Dinner.

24. Researcher: can you tell me how to make Kraft Dinner?
Researcher: how do you do it?
Participant: you just add ch cheese and.
Researcher: mmhm?
Participant: then you boil it in the pot.
Researcher: mmhm?
Participant: but first you have to wait 'til the wa # for the water to boil!
Participant: that's ***all**.

B ii) *Degree on a Scale*

Here, we were coding for scalar or comparative adjectives whose satisfiers lie on a continuum, so that a thing can be more or less such-and-such. What the coder is looking for is whether pragmatics plays a role in determining how far along the scale the talked about object must be to count as such-and-such in the context. For instance, 'rich' corresponds to a scale of wealth, and some people are richer than others. How rich a person is claimed to be in a given utterance of "She is rich" will depend on background contextual factors.

With respect to coding for errors, this was another case where, grammatical mistakes aside, very few uses were judged incorrect. As with (A iv) above, one possible explanation for this is the methodological limitations of our corpus-based approach.

C i) *Homophony*
This is coded when the same *sound pattern* corresponds to two different words (e.g. 'bank'). Genuine homophony is a historical accident, in the sense that the same sound just happens to be shared: there remains no semantic link between the words associated with the same sound. A good test for this is whether the two words share the same sound across languages – especially across historically unrelated languages . (E.g., 'box' is homophonous in English. That there really are two words here is suggested by the fact that there are two unrelated translations into Spanish, namely 'embalar' (i.e., to place into a box) and 'boxear' (i.e., to fight with the fists.)

This kind of ambiguity is to be contrasted with polysemy, explained below, in which a single *lexical item*, e.g., a single word, has multiple related senses, possibly derived from one "core" sense. It is also important to distinguish homophony from vagueness. In the case of vagueness, the lexical item has one sense, but the boundaries of the expression are not precise (e.g., 'tall', 'bald', 'rich'). These would be coded as (B ii). Homophony is also not coded when the grammatical context rules out one reading of the sound pattern. For instance, in "I am two years old", the sound /tu/ could be considered homophonous insofar as it corresponds to both the word "two" and the word "too". However, the grammatical context "__ years old" disambiguates /tu/. Thus this case of "homophony" would be ignored in coding the corpus.

Pragmatic difficulty with homophony was quite rare in the data. It may be identified if the interlocutor signals being unable to interpret the intended meaning of the sound, i.e., which word or phrase was meant. For instance, in (25) the researcher is unable to retrieve the intended meaning of 'papa' immediately. In addition, the coder may recognize an ambiguity problem in the form of a misunderstanding that was not evident to the conversational participants at the time of the interaction.

25. Researcher: does grandpa take you places?
Participant: yeah.
…
Participant: *__papa__ came out there.
Researcher: oh he did?
Participant: yeah.
Researcher: oh.
Researcher: is papa you gran your grandad # <your> [>] grandfather?
Participant: <yeah> [<].

C ii) *Polysemy*
As noted immediately above, this is coded where a range of related senses are associated with a single lexical item. For instance, "cut" connotes different kinds of physical motions in "cut the grass" versus "cut the cake". But, as evidenced by the behavior of its translations in other languages, this is not mere accidental homonymy. Returning to Spanish, the translation of "cut" on its various senses is the single word "cortar".

It can be very difficult to distinguish polysemy from homophony is some cases. Continuing with the present example, consider the following uses:

26. Cut a diamond
27. Cut a scene from a movie
28. Cut a member from the cast
29. Cut and paste text in a document
30. Cut taxes
31. Cut the cards

One would be hard pressed to say whether we have various discrete meanings here, linked only historically to the same sound, or whether instead there is a "core" content CUT with a wide variety of physical realizations. What is more, a sound which is ambiguous can have one or more of the associated words being polysemous. Thus, the sound */kut/* appears to exhibit three quite discrete meanings in 'cutting the cake', 'cutting a class' and 'a cutting remark'. In addition to its homophony, however, on its first "core" meaning it is polysemous as well.

No pragmatic error with respect to polysemy was coded in our entire corpus. The only mistake noted involved the child echoing the researcher's word, but using it in the wrong tense – a grammatical problem.

V. Quantitative Results

Our raw numerical results are summarized in the following two tables. The first shows, for each participant, the total number of usages of the pragmatic device in question, and the number of these which involved a pragmatic error. The second table shows the percentage of errors, in bar graph format.

Conversation	1	2	3	4	5	6	7	8	9	10	11	12	**Total**
Ai (*Indexicals*) Total occurrences	138	189	22	77	224	77	119	195	62	18	41	91	1421
*Ai Number of errors	24	10	0	3	7	5	2	8	4	5	0	1	69
Aii (*Sub-sentences*) Total occurrences	7	4	7	5	7	1	1	10	15	10	8	23	98
*Aii Number of errors	1	1	1	1	0	0	0	1	4	1	4	15	29
Aiii (*Null Complements*) Total occurrences	20	56	13	25	25	18	15	33	9	31	6	31	282
*Aiii Number of errors	10	14	1	4	8	0	4	5	2	11	3	7	69
Aiv (*Possessives*) Total occurrences	11	5	1	3	8	3	14	11	7	22	2	5	92
*Aiv Number of errors	0	0	0	0	1	0	0	0	1	0	0	0	2
Bi (*Quantifier domain*) Total occurrences	17	28	3	22	7	12	24	18	7	11	3	13	165
*Bi Number of errors	0	4	0	0	0	0	2	3	0	1	0	1	11
Bii (*Degree on a scale*) Total occurrences	12	32	0	1	11	8	25	6	14	8	1	11	129
*Bii Number of errors	0	0	0	0	0	0	0	0	0	0	0	0	0
Ci (*Homophony*) Total occurrences	151	151	14	46	170	32	66	69	21	62	7	36	825
*Ci Number of errors	1	1	0	0	1	0	0	0	0	0	0	2	5
Cii (*Polysemy*) Total occurrences	77	89	13	27	46	18	60	53	19	61	15	48	526
*Cii Number of errors	1	2	1	0	0	1	1	1	3	0	2	1	13

Table 1. Total number of usages and errors

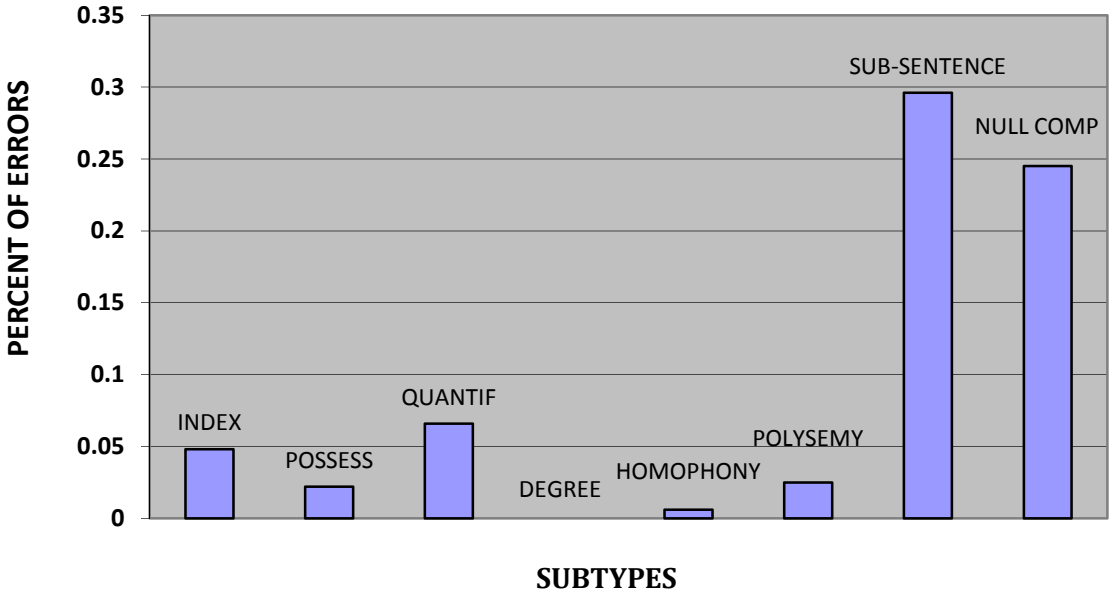

Table 2. Percentage of Errors

VI. Summary, Methodological Limitations and Future Research

Our question, recall, was whether certain pragmatic tasks are more difficult than others for people with ASD. The results of this study, tentative though they may be, provide further evidence for a positive answer. In particular, in addition to the differential abilities with respect to non-literal versus literal pragmatics described in de Villiers et al. 2007b, it appears that properly using sub-sentences and null complements – both of which are sub-varieties of pragmatic determinants of literal content – is rather harder for speakers with ASD than any of the other six sub-varieties that we coded for.

Of course, we must underscore the word 'tentative' when considering these results. This is because there are four important methodological limitations of this study. First, the present study draws solely on production data to draw inferences about pragmatic abilities. Second, our pool of subjects was small. This already limits significantly the conclusions that can be reached regarding differential pragmatic abilities in ASD. A third limitation, already mentioned, concerns the identification of errors. Two of the three kinds of errors could be recognized with some certainty, namely grammatical mistakes and cases where there is some breakdown in communication, followed by a request for clarification or a repair in the discourse. The third means of identifying error, however, involves the coder encountering difficulty interpreting the speaker's message, and inferring that this traced to the speaker with ASD not adequately anticipating the interlocutor's conversational needs. This means of "diagnosing errors" is risky, albeit necessary.

A final methodological lesson became apparent when we considered our initial quantitative results. For certain categories, the number of errors was very small. This may trace to the fact that possibilities for detecting such "pragmatic errors" in a written corpus are very limited: e.g., with respect to degrees on a scale, the only case where error or difficulty could be detected was when a person misspoke (i.e. grammatical problems). As Lenny Clapp pointed out to us in conversation, this should not have been surprising in principle: if we ask ourselves what such errors would "look like", in a transcribed text, the answer is unclear. These categories in particular then, are limited in their potential to inform us about gradation with respect to literal pragmatic abilities.

Our next step will be another study, still focused on production, but which nonetheless attempts to address some of the foregoing limitations. We are presently collecting data from a larger group of youths with ASD. This will speak to the issue of sample size. With respect to error identification, we may need to omit degree on a scale from future error coding. In addition, although the difference between polysemy and homophony may be clear enough in principle, in practice it proved very difficult to tease them apart. There were too many borderline cases. Thus, it would seem prudent to combine these into a single category. This new study also includes controls. These will be informative in two ways. First, it should prove very useful to understand to what extent the pragmatic abilities considered above are dissociated in the non-ASD population, particularly in linguistically aged-matched controls. What is more, while error coding in some cases may not succeed, it is still possible to look at frequency of use relative to a control group, as a possible indication of differentiation among pragmatic (dis)abilities. At the same time, we are also performing neurocognitive tests on these new participants, in an attempt to uncover the specific psychological correlates of differential pragmatic abilities in ASD.[8] We will compare performance on the sub-varieties where we can fairly accurately code errors with scores on these experimental tests. This is part of our long-term goal of uncovering not just variation in *behavioral ability* among pragmatic tasks in ASD, but the distinct information bases and underlying mechanisms which may causally underpin them. Drawing upon such results we hope, in the longer term, to infer the cognitive groundings for neurotypical pragmatics.

[8] Specifically, the Wisconsin Card Sort Task (Heaton 1981), the Tower of Hanoi (Borys, Spitz & Dorans 1982), the Mind in the Eyes Test (Baron-Cohen, Wheelwright, Raste & Plumb 2001), the Mind in the Voice Test (Rutherford, Baron-Cohen & Wheelwright 2002), the Homograph Test and the Sentence Completion Test used by Happé (1997) and the un/segmented Block Design Task (Shah & Frith 1993).

VII. References

Asp, E. & de Villiers, J. (2010). *When language breaks down: Analysing discourse in clinical contexts.* Cambridge: Cambridge University Press.

Asperger, H. (1944/1991). ”Autistic psychopathology” in childhood. In U. Frith (Ed.), *Autism and Asperger syndrome* (pp. 37-92). Cambridge: Cambridge University Press.

Bach, K. (1994a). Semantic slack: What is said and more. In S. Tsohatzidis (Ed.), *Foundations of speech act theory* (pp. 267-291). London: Routledge.

Bach, K. (1994b). Conversational impliciture. *Mind & Language, 9*, 124-162.

Bach, K. (2001). You don’t say? *Synthese, 128*, 15-44.

Baltaxe, C. (1977). Pragmatic deficits in the language of autistic adolescents. *Journal of Pediatric Psychology* 2: 176-180.

Baltaxe, C., Simmons, J. Q., & E. Zee (1984). Intonation patterns in normal, autistic and aphasic children. In A. Cohen & M. van de Broecke (Eds.), *Proceedings of the tenth International Congress of Phonetic Sciences* (pp. 713-718). Dordrecht: Foris Publications.

Baron-Cohen, S. (1995). *Mindblindness: An essay on autism and theory of mind*. Cambridge, MA: MIT Press.

Baron-Cohen, S., Wheelwright, S., Hill, J. Raste, Y. & Plumb, I. (2001). The “Reading the mind in the eyes” test revised version: A study with normal adults, and adults with Asperger syndrome or high-functioning vutism. *Journal of Child Psychology and Psychiatry, 42* (2), 241-251.

Borg, E. (2004). *Minimal semantics.* Oxford: Oxford University Press.

Borys, S. V., Spitz, H. H. & Dorans, B. A. (1982). Tower of Hanoi performance of retarded young adults and nonretarded children as a function of solution length and goal state. *Journal of Experimental Psychology, 33,* 7-110.

Carston, R. (1988). Implicature, explicature, and truth-theoretic semantics. In R.M. Kempson (Ed.), *Mental representations* (pp. 155-181). Cambridge: Cambridge University Press.

Carston, R. (2002). *Thoughts and utterances*. Oxford: Blackwell.

Cummings, L. (2009). *Clinical pragmatics*. Cambridge: Cambridge University Press.

de Villiers, J. & Szatmari, P. (2004). Message organization in Autism Spectrum Disorder. In G.D. Fulton, W.J. Sullivan & A.R. Lommel (Eds.), *LACUS Forum XXX: Language, Thought and Reality* (207-214). Houston: LACUS.

de Villiers, J., Fine, J., Ginsberg, G., Vaccarella, L. & Szatmari, P. (2007a). Brief report: a scale for rating conversational impairment in autism spectrum disorder. *Journal of Autism and Developmental Disorders, 37* (7), 1375-1380.

de Villiers, J., Stainton, R.J. & Szatmari, P. (2007b). Pragmatic abilities in Autism Spectrum Disorder: A case study in philosophy and the empirical. *Midwest Studies in Philosophy, 31*, 292-317.

Fine, J., Bartolucci, G., Ginsberg, G. & Szatmari, P. (1991). The use of intonation to communicate in pervasive developmental disorders. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 32* (5), 771-782.

Fine, J., Bartolucci, P., Szatmari, P. & Ginsberg, G. (1994). Cohesive discourse in pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 24*, 315--329.

Frege, G. (1919). Thoughts. In B. McGuinness (Ed.), *Gottlob Frege: Collected papers on mathematics, logic and philosophy* (pp. 351-372). Oxford: Basil Blackwell.

Frith, U. (2003). *Autism: Explaining the enigma*. 2nd Edition. Oxford: Blackwell.

Grice, H. P. (1975). Logic and conversation. In R. Cole & J. Morgan (Eds.) *Syntax and semantics: Speech acts* (pp. 41-58). New York: Academic Press.

Happé, F. (1993). Communicative Competence and Theory of Mind in Autism. *Cognition, 48,* 101-119.

Happé, F. (1995). Understanding minds and metaphors: Insights from the study of figurative language in Autism. *Metaphor and Symbolic Activity, 10* (4), 275-295.

Happé, F. (1997). Central coherence and theory of mind in autism: reading homographs in context. *British Journal of Developmental Psychology, 15,* 1-12.

Heaton, R. K. (1981). *Wisconsin Card Sorting Test manual.* Odessa, FL: Psychological Assessment Resources.

Iten, C., M.-O. Pyke, J.A., Stainton, R. J. & Wearing, C. (2005). Null complements: Licensed by syntax or by semantics-pragmatics?" In M. Junker, M. McGinnis & Y. Roberge (Eds.), *CLA Annual Conference Proceedings/Actes du congrès de l'ACL* (pp. 1-15).

Junker, M., Stainton, R. & Wearing, C. (2006). The semantics and syntax of null complements. *Carleton University Cognitive Science Technical Reports*. Report #2006- 03.

McCarthy, D. (1972). *Manual for the McCarthy Scales of Child's Ability*. New York: The Psychological Corporation.

Récanati, F. (2001). What is said" *Synthese, 128,* 75-91.

Récanati, F. (2002). Unarticulated constituents. *Linguistics & Philosophy, 25,* 299-345.

Récanati, F. (2004). *Literal meaning*. Cambridge: Cambridge University Press.

Rutherford M. D., S. Baron-Cohen & S. Wheelwright (2002). Reading the mind in the voice: a study with normal adults and adults with Asperger syndrome and high functioning autism. *Journal of Autism and Developmental Disorders, 32* (3), 189-194.

Searle, J.R. (1978). Literal meaning. *Erkenntnis, 13*, 207-224.

Searle, J. R. (1980). The background of meaning. In J. Searle, F. Kiefer & M. Bierwisch (Eds.), *Speech act theory and pragmatics* (pp. 221-232). Dordrecht: Reidel.

Shah, A. & U. Frith (1993). Why do autistic individuals show superior performance on the Block Design task? *Journal of Child Psychology and Psychiatry, 34,* 1351-1364.

Sperber, D. and Wilson, D. (1986). *Relevance*. Oxford: Blackwell.

Stainton, R. J. (2006). *Words and thoughts*. Oxford: Oxford University Press.

Stanley, J. (2000). Context and logical form. *Linguistics and Philosophy, 23*, 391-434.

Index of Terms: (in the order they appear)

Autism Spectrum Disorders (ASD): A broad continuum of cognitive and behavioural disorders marked by three core features: 1) impairments in communication; 2) difficulty with socialization; and 3) restrictive and repetitive patterns of behavior.

False belief task: A task designed to examine development of theory of mind. The task involves examining whether children are able to attribute false beliefs to others – that is, recognize that what others believe may indeed be wrong or false.

Echolalia: The immediate or delayed repetition of a word or phrase. Echolalia often involves the same intonation pattern as the person they are echoing.

Joint attention: Using a non-verbal means of communication such as pointing or eye gaze to orient another person to a stimulus.

Stereotypy: A repetitive or ritualistic behavior (action or utterance) such as hand-flapping, walking on toes or lining up toys.

Interlocutor: A participant in discourse.

Indexical: The use of a pronoun or demonstrative whereby the speaker assumes that the interlocutor knows the referent.

Sub-sentence: A word or phrase that stands alone to convey propositional content. In contrast to ellipsis, the missing constituents cannot easily be reconstructed.

Null compliment: When the phonologically realized compliment in a phrase has been omitted.

Possessive: An instance where the relation between the possessor and the possession cannot be merely decoded, but must rather be pragmatically filled in on the basis of real world knowledge and context-based inference.

Quantifier Domain Restriction: An utterance where the speaker uses a quantity word (e.g. *all, some, none*) but has a specific domain in mind, which he/she intends the listener to pick up on via the context at hand.

Scalar/comparative adjectives: Adjectives which are on a continuum when compared to the real world.

Homophony: A word that has multiple unrelated meanings.

Polysemy: A word that has multiple related senses associated with it.

Theory of Mind: Also referred to as **Mind Reading**. This can be defined as the ability to predict others' mental states (i.e. desires, beliefs, thoughts, intents, etc.) and understand that the mental states of others may be different from one's own.

EXTRA: In case it's useful, here is a copy of Table 1. Number of Uses that has not been saved as an image (can be adjusted).

Conversation	1	2	3	4	5	6	7	8	9	10	11	12	**Total**
Ai (*Indexicals*) Total occurrences	138	189	22	77	224	77	119	195	62	18	41	91	1421
*Ai Number of errors	24	10	0	3	7	5	2	8	4	5	0	1	69
Aii (*Sub-sentences*) Total occurrences	7	4	7	5	7	1	1	10	15	10	8	23	98
*Aii Number of errors	1	1	1	1	0	0	0	1	4	1	4	15	29
Aiii (*Null Complements*) Total occurrences	20	56	13	25	25	18	15	33	9	31	6	31	282
*Aiii Number of errors	10	14	1	4	8	0	4	5	2	11	3	7	69
Aiv (*Possessives*) Total occurrences	11	5	1	3	8	3	14	11	7	22	2	5	92
*Aiv Number of errors	0	0	0	0	1	0	0	0	1	0	0	0	2
Bi (*Quantifier domain*) Total occurrences	17	28	3	22	7	12	24	18	7	11	3	13	165
*Bi Number of errors	0	4	0	0	0	0	2	3	0	1	0	1	11
Bii (*Degree on a scale*) Total occurrences	12	32	0	1	11	8	25	6	14	8	1	11	129
*Bii Number of errors	0	0	0	0	0	0	0	0	0	0	0	0	0
Ci (*Homophony*) Total occurrences	151	151	14	46	170	32	66	69	21	62	7	36	825

*Ci Number of errors	1	1	0	0	1	0	0	0	0	0	0	2	5
Cii (*Polysemy*) Total occurrences	77	89	13	27	46	18	60	53	19	61	15	48	526
*Cii Number of errors	1	2	1	0	0	1	1	1	3	0	2	1	13