

Asperger Syndrome and Mobile Phone Behavior

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Abstract. This paper introduces the idea of using modern technology to work as an assistive tool for adults with Asperger's Syndrome (AS) and Higher-Functioning Autism (HFA) The study investigated the use of mobile phones by a neurotypical control group. Participants reported their pattern of phone use given specific social scenarios. Results showed that participants were more likely to use the text messaging facility on their phone to contact someone rather than call them. It also showed that their choice of communication mode did not differ given different social scenarios and neither did it when the information was given from the recipients' perspective. Further investigation is described where this information will be compared to a group of AS individuals.

Keywords: Asperger's Syndrome, Autism, Computer mediated communication, mobile phones.

1 Introduction

This paper describes research which is investigating how advances in computer mediated communication (CMC), such as mobile phone calls and texting, may be used to benefit individuals with Asperger Syndrome (AS) or Higher-functioning Autism (HFA)¹. Hans Asperger, 1944 paper, first described the neurodevelopment disorder of Asperger Syndrome (AS), a classic literature of child psychiatry [1]. However up until 1981 AS was considered to be covered within the term Autism, Frith (1991) explains that this was partly due to Asperger's pioneering paper only being available German. Wing (1981) recognized and emphasized the differences between Classic Autism and AS. From her work, AS began to be considered as being on the spectrum of Autism i.e. an Autism Spectrum Condition (ASC) on which AS lay towards the high functioning end [2].

Asperger Syndrome has been described as having a 'triad of impairments' [3], this model consists of Social and Emotional impairments, Language and Communication impairments and Flexibility of Thought impairments. Figure 1 shows the triad and its subcategories.

¹ From this point references to AS will include HFA.

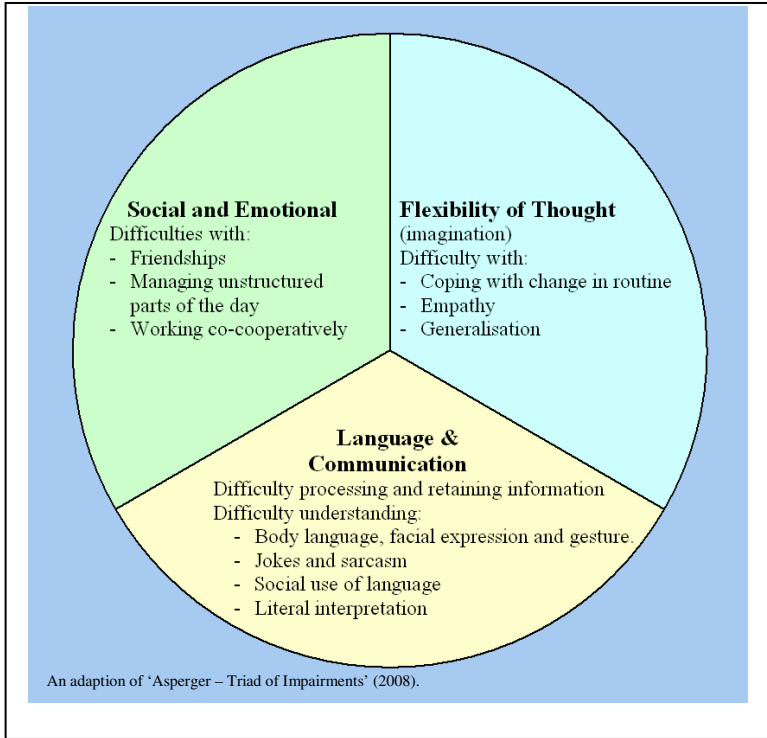


Fig. 1. The Triad of Impairment found within Asperger's Syndrome

This triad has shown to be a well standing general framework for the understanding of AS. These impairments are not always present in each and every individual with AS; with this in mind the model can increase our understanding of AS in general as well as on an individual level.

The research described in this paper is concerned with a one aspect of each of the triad, namely friendships, social use of language, and empathy. This paper investigates empathy is a core element of successful communication.

Empathy is notoriously difficult to define [4], but simplified is the understanding of another persons view point, from an emotional and cognitive perspective. Classic autism is associated with significant impairments in empathetic skills. This deficit manifests within the individuals behaviors in such ways as: lack of interest in others, lack of consideration of other peoples opinions, lack of awareness and understanding of body language and unspoken cues, lacking the ability to envisage another persons metal state; 'metalizing' etc[5]. Although this is not an exhaustive list of the possible effects a deficit of empathy can have, these are really at the root of the problem that autistic individuals have when interacting with others. When it comes to AS these impairments are generally to a lesser degree and more discreet, hence why it is helpful here to understand the problems given the most extreme case scenario.

Empathy is said to have several levels [6], the specific level this paper looks at is the cognitive aspect of empathy; otherwise known as Theory of Mind (ToM). Theory of Mind is the understanding of another person's perspective; awareness of the mental states of others [7]. Developmental delays and impairment in ToM have been shown in AS, with the impairments being more subtle and complex in adulthood than childhood [8]. People with AS tend to pass traditional ToM tasks that were developed for use with children with a suspected ASD [9, 10], however the passing of these tasks by adults with AS does not necessarily indicate normal ToM function (Rutherford et al, 2002). A more discreet test of ToM was devised; 'Reading the Mind in the Eyes' task [11]. Participants in the AS group were found to be not so good at identifying the emotion exhibited in the faces of pictures. Later Rutherford et al (2002) developed a similar test where people were required to identify emotion based on vocalizations; 'Reading the Mind in the Voice' task. Again the AS group were not as good as the control group. However, the range of results within the AS group in both 'Reading the Mind in the Eyes' and 'Reading the Mind in the Voice' meant that neither test could be used as a independent diagnostic tool, but could be included within a battery of tests for Asperger's diagnosis (Rutherford et al, 2002).

Although people with AS are often spoken about as having impairments or weaknesses, as above, these traits are not always perceived as disadvantages to the individual [12]. Baron-Cohen discusses AS as being a condition rather than a disorder [13]. One particular trait of AS is that on average they are better at systemizing than the average neurotypical person [14]. Baron-Cohen (2002b) developed the male-female brain theory of autism. Through his research he showed that males were more systematic than females and females more empathetic than males. He then went on to show that autistic individuals were even more systematic than the average male and even less empathetic than them too; hence the terminology 'the extreme male brain' explanation of autism. The poor ability of empathizing has already been discussed, be in a negative light. However, on the positive side people with an ASC have a greater ability to systemize.

There are many forms of systemizing; musical systemizing, spatial systemizing, natural systemizing just to name a few. A high ability to systemize helps people in many ways; from being organized on a day to day basis, to the understanding of physical processes and mathematical practices. Within the AS population this skill is reflected in their commonly seen fixated interests, e.g. train locomotives, computers, and routines, this is because natural systemizers investigate only varying one thing whilst everything else stays constant (Baron-Cohen, 2002). On an anecdotal level the magazine *Wired* in 2001 reported that ASC was rather prevalent in Silicon Valley California in work that heightened systemizing skills could be taken into the workplace, from this they coined the term 'the geek syndrome' as reference to AS².

1.1 Asperger's Syndrome and Technology

The heightened systemizing ability of people with AS could be drawn upon to benefit the social interaction skills of people with AS, in which they tend to be inhibited. This

² *Wired* magazine article available at http://www.wired.com/wired/archive/9.12/aspergers_pr.html

idea of drawing on systematic tools, as aids for people with AS, has been used in previous research. Quite a considerable amount of research has gone into technology as learning tools in the field of humanoid robotics [15-18]. Along side this, research has taken place that has led to the development of computer applications that aim to assist individuals with social deficits such as the understanding of emotions expressed through facial expressions (e.g. Mind Reading [19] and The Transporters [20]). However the majority of these tools are aimed at children with ASC's rather than adults.

Previous computer applications that have been developed to date have also been based around desktop computers and therefore not available to the individual at all times. A technology that would be in the ideal position as a platform for an assistive tool would be the mobile phone; a prevalent social tool that is widely accepted within society [21]. With mobile phone use having risen dramatically in the past 10 years; reaching the impressive mile stone, in 2002, of having more subscribers than the traditional landline telephone [22]. Indeed Srivastava goes on to describe the mobile phones as having become a key social object, being both a social and technological phenomena.

The 'digital divide' is a phrase that is commonly used to describe the notion of the divide between those who have access to technology and those who don't. Jones and Marsden [21], talk about the 'digital divide' as being something that is important to bridge otherwise it adds to the barriers that come between the developed and developing world. Although in this sense it is spoken about having physical access this concept could also be applied to accessibility. Considering that people with AS often experience social difficulty this may lead to difficulties or hesitations using social technologies such as the mobile phone. As mobile phones are targeted at the mass market, the majority of phone applications are too. Mobile phone use by the AS population, has previously lacked research therefore how people with AS use and would like to use the mobile phone, which would need to be investigated before any AS targeted applications be developed.

Whilst the mobile phone is still new technology it would be an appropriate time to develop a more AS user friendly mobile phone application as anecdotal data (e.g. Srivastava, 2005) indicates that social etiquette for phones, in general, is still developing. For the individual with AS this would mean that they would be free to use the phone when and where they thought suitable and learn the social etiquette at the same time as other, Neurotypical (NT), phone users.

1.2 Aims of This Research

The intention of this study was to establish how NT people use their phones. In doing so it was investigate whether a stable social etiquette has been established for use of mobile phones within the NT population. It will look into whether people consider the other recipients perspective when using their mobile phones. Another aspect of the study will check that NT people are using mobile phones in the way they would like to and that nothing in constricting their use. Combined this information will form the baseline information needed in order to continue to identify any differences in needs from or use of mobile phones people with AS have compared to the NT population.

2 Method

Participants were recruited from the University of Lincoln and surrounding area. Some of the University participants received a reward in the form of a credit for the Psychology Department credit pool system, the remaining were entered into a draw to win a Nintendo Wii games console. 65 participants were tested; one participant's results were removed from the analysis as the participant did not fall within the control criteria (see measures section). Data sets from 64 participant's were analyzed; 15 males and 49 females (mean age of 22.89 (2dp)). Each participant carried out the same questionnaire.

This study took the form of a questionnaire carried out in a one to one interview setting. The Questionnaire consisted of three sections; demographic information, scenario questions and opinion questions.

2.1 Demographic Information

A modest amount of information about the participant were acquired; age, gender, education and employment. This information was collected in an interview format where the experimenter asked the same set of question to each participant. This demographic information was taken for future use in the aim to acquire matched participants from an Asperger population

2.2 Scenario Questions

The scenario section of the study was in questionnaire format. The experimenter first gave a verbal brief about the task, participant then worked through the questions with no experimenter intervention.

The questionnaire consisted of seventeen, two part questions. Each question set out a scenario to which the participants had to respond. The scenario gave information either from the participant or the prospected recipient perspective. A small amount of social information was given; whether they or the recipient were either with a single person or within a crowd of five people. This social information about their company was given in form of a list of people around at the time; this information was balanced for sex across the questions. Figure 2 shows one question from each perspective.

Participants were required to respond on two 6-point Likert scales; one reporting their likelihood of using a voice call, the other their likelihood of using a text message to contact the person mentioned in the scenario.

2.3 Opinion Questions

Three questions were asked by the experimenter. Participants' responses were recorded for accurate transcription. All participants were asked the same questions, with the experimenter asking standard prompts if the question was not fully answered.

The questions were designed to investigate whether the participants use their mobile phones in the way wished to; if not, what is constraining their use.

a) Scenario from the participants perspective with five people for company.

You would like to contact a friend. They are with Jessica, Abigail, Holly, Millie and Max.

Do you **make a voice call** to the recipient?

Definitely Not Very Unlikely Unlikely Likely Very Likely Definitely

Do you send a **text message** to the recipient?

Definitely Not Very Unlikely Unlikely Likely Very Likely Definitely

b) Scenario from the recipients perspective with one person fro company.

You are with Matthew. You would like to contact a friend

Do you **make a voice call** to the recipient?

Definitely Not Very Unlikely Unlikely Likely Very Likely Definitely

Do you send a **text message** to the recipient?

Definitely Not Very Unlikely Unlikely Likely Very Likely Definitely

Fig. 2. Examples of the scenario questions

2.4 Measures

All participants were required to fill out the Autism Spectrum Quotient [23]. The AQ was used to ensure participants fell within the control population for further investigations. Participants that had a high number of traits in common with AS were not considered a control population. This was given to participants after the main batch of questionnaires to ensure it had no effect on the main experiment.

Results

3.1 Scenario Questions

The Likert scale responses were analyzed using a 2 (Perspective; Participant, Recipient) x 2 (Company; One, Five) x 2 (Mode, Call, Text) repeated measures analysis of variance. The results indicated a significant main effect of Mode, [$F(1,63) = 70.72, p < 0.001$], showing that participants likelihood of using the different Modes of communication differed. A mean score from the 'Text' questions [$\mu = 4.620$ (3dp)] compared with those from the 'Call' questions [$\mu = 3.368$ (3dp)] indicates that text messages were more likely to be used than voice calls.

No main effect of Company was found [$F(1,63) = 0.039, p = 0.843$], indicating no difference in phone use in the different social settings used. No main effect was found of Perspective [$F(1,63) = 0.234, p = 0.631$], showing no difference in use when information was given from their own or the recipients perspective.

There were no significant interaction effect between Perspective and Company [$F(1,63) = 0.480, p = 0.491$], Perspective and Mode [$F(1,63) = 0.020, p = 0.888$],

Company and Mode [$F(1,63) = 0.432, p = 0.513$], or between all three [$F(1,63) = 2.564, p = 0.114$].

3.2 Opinion Questions

Although a full analysis has yet to be completed on the opinion questions, anecdotally the experimenter reported that the main cause of constrain to phone use was cost. When asked how their use would differ if this constrain was not in place some participants reported that their general use would increase, others said it would not differ however the overall impression was that this constraint didn't effect their use drastically. A few people reported social situations such as lectures as constraining their use, but these socially conscious participants were in the minority.

Overall it would seem that participants use their phones in the way that they would like to do so.

4 Discussion

There are three main findings from this study. Firstly, very simply, our participants reported that they are more likely to use text messages to contact people. Secondly that whether they are in company of a crowd or an individual does not make a difference on the communication mode (be it voice call or text message) they are likely to choose to use. And finally that when given information from their own perspective, or from the recipients, does not influence their choice of communication mode to use. The findings from this study make a simple base line for comparison to an AS population at a later date as no interaction effects were found with only one main effect found.

The results support the anecdotal literature [22] and show that a social etiquette does not seem to have been developed as regards to being in company. For people with AS this may have positive implications; to use their mobile phone in a social setting at any time they like would therefore not be inappropriate as there are no set social rules that they will be breaking or for that matter confused by. To use a device that has already been accepted within society, and that is not yet surrounded by unsaid social rules, would mean the use of an application on the mobile phone would be discreet.

It was also interesting that text messaging was the preferred choice of the NT participants. This means that if people with AS find synchronous communication difficult, because of the complex social cues [14, 24], asynchronous chat via text messaging again can be used discreetly.

To find no difference in choice of mode when scenarios are from the senders or the recipient's perspective indicates that the NT population empathize with the recipient in these circumstances. It will therefore be interesting to see whether this real world use of ToM is challenging for people with AS. As the literature suggests ToM deficits in AS are not strikingly obvious and it would be interesting to see whether the difficulties that Rutherford et al found through his 'Reading the Mind in the Voice' task [8] translate to mobile phone use

4.1 Further Work

From these findings further research will be done on establishing a fuller view of how NT people use their mobile phones and progress to compare this to the mobile phone use of people with AS. Current work is underway looking at actual phone use of NT people, this will be compared with their projected use reported in this study.

Another area that will be investigated is phone use given the recipients familiarity to the participants. Individuals with AS may find it difficult to adopt a socially appropriate language given the context and relationship of recipient [24]. Difficulties in adopting appropriate language and understanding friendships are two subcategories that lie within the 'triad of impairment', mentioned earlier; both being useful for successful social communication [3].

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