Computer-mediated task-based learning and Asperger's syndrome

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Abstract: This paper examines the nature of Asperger's syndome, in particular the language and social difficulties which the disorder under investigation causes and justifies why these deficits could to a certain extent be surmounted through a computer-mediated task-based approach to learning.

Key words: Asperger's syndrome, language and social difficulties, task-based learning, computer-mediated learning

Introduction

The Asperger's syndrome is commonly referred to as a pervasive developmental disorder placed at the high functioning end of the autism spectrum. People suffering from this disorder share at varying extents symptoms encountered in autism. The main difference lies in that Asperger's sufferers are equipped with adequate or above average cognitive and intellectual capacities (Ghaziuddin & Mountain-Kimchi, 2004; Klin & Volkmar, 2000) -sometimes accompanied by inherent gifts and talents- and are often willing to establish relationships with others.

There are many cases of individuals with Asperger's who manage not only to overcome many of their challenges, but also to excel in certain fields as they grow older. These cases speak to the fact that their brain -like most human brains- is trainable and in some instances even exceptionally gifted. It is therefore paramount to provide them with the right education so as to assist them in reaching the maximum of their potential, building on their strengths. In order to target the challenges faced by people with Asperger's appropriately, the nature of the challenges in question needs to be identified. Chapter 1 attempts to decompose the main areas in which this "mild autism" (Little, 1999) under investigation manifests itself, namely language and social difficulties. Then, chapter 2 proposes a computer-mediated task-based approach to learning, to support people with Asperger's syndrome in developing language as well as social skills, finally leading to a sound socialization.

1. The Asperger's syndrome as reflected in language and social difficulties

1.1. Language difficulties

As children with Asperger's grow up, they gradually overcome language inaccuracies which may appear at very young ages, many of them even displaying verbal mastery, demonstrated by making use of enriched vocabulary and complex syntax. Although at first sight there seems to be nothing wrong with their speech, due to their correct grammatical and structural approach of it, one can before long realize its inappropiacy and awkwardness, manifested through irrelevant comments, sudden and unexpected changes of conversational topics, abrupt and unnatural initiation of discussions, coinages and idiosyncratic language (Eisenmajer, Prior, Leekam, Wing, Gould, Welham, & Ong, 1996), inadequacy in comprehending figurative language, humor and irony (Pexman, Rostad, McMorris, Climie, Stowkowy, & Glenwright, 2011) and difficulty in sustaining a dialogue. This is where the core, the essence of Asperger's syndrome lies, as revealed through everyday language use: Although Asperger's sufferers' language is syntactically, grammatically and -in many cases- semantically[1] acceptable, it often seems to be detached from a pragmatic context (Loukusa & Moilanen, 2009), as if it is intended to function for its own sake, at a loss to be in tune and coordinated with the meanings expressed by the others, exactly because they lack the innate capacity to effectively interact and communicate.

Pragmatically speaking, we could say that the language individuals diagnosed with Asperger's use, more saliently at young ages, expresses an interest of a person in themselves. This is not surprising though, as the Autism Spectrum Disorder derives its definition from the Greek word «αυτός», which means "self", plus the suffix «-ισμός», which indicates a state. In other words, the meaning of the word "autism" declares a focus on the self. By stating this, it would be unfair to infer that these special people do not have feelings for others or interest in establishing relationships with them. On the contrary, many of them desperately long for friends and are very emotional and caring. The problem lies in the fact that they often do not know how to channel their interest and sentiments into socially accepted manifestations, simply because they are deprived of the capacity to be socially competent, flexible and skilful, which is inherent to typically developing people. Apart from the inappropiacy of language use, another reason people with Asperger's may attract negative attention, is the awkwardness in the prosody of their oral speech (Paul, Shriberg, McSweeny, Cicchetti, Klin, & Volkmar, 2005), that is how rhythm and intonation are demonstrated through spoken language. Some individuals with this disorder display flat, monotonous, high-pitched, loud, slow or too "childish" a speech, which are elements that can put them "on the spot", even in cases where

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[1]Although most utterances seem semantically normal, that is they are meaningful when considered individually, they may not fit a particular moment or situation. For instance, if a child asks somebody unexpectedly: "What is your favorite Christmas song?" or "Have you ever broken a leg?" the sentences make perfect sense, but the addressee is taken by surprise.

the content of their speech is appropriate.

1.1. Social difficulties

Language tends to be deemed as a means conveying how one perceives the world, according to the way the brain functions. Specifically, Wittgenstein (1963) considers language as a vehicle of thought. Drawing on this realization, we could argue that the language people with Asperger's syndrome use reflects the deficits which characterize the way they think. These deficits have been found to be epitomized in a triad of features including social interaction, social communication and social imagination[2] (Wing, 1993; Happé & Ronald, 2008). Although Asperger's sufferers are placed at the high functioning end of the autism spectrum, they experience to varying extents the impact of their social impairments on many aspects of their everyday lives. Most of their social challenges spring from their deficit in comprehending the "theory of mind", that is to be able to infer the mental states of others (Baron-Cohen, 2001). It is not accidental that their lack of ability to "read other people's mind" so as to understand or at least second guess their intentions, points of view, feelings and wishes, as well as potential reactions to words or actions, is also referred to as "social blindness" (Foden & Anderson, 2009). An inability as such is strikingly manifested in their disposition to be straightforward, outspoken, truthful or spontaneous, especially at young ages; these features tend to prove anything but helpful in a society where revealing feelings and thoughts seems to be considered a weakness and that approaching social situations in a so called diplomatic way is usually preferable to the direct way of doing so.

In addition, the obsession displayed by people with Asperger's with circumscribed interests[3] (Boyd, Conroy, Mancil, Nakao, & Alter, 2007) and the related insisting and repetitive questions and discussions on specific topics, combined with their difficulty in pragmatically fitting in conversations or maintaining eye contact and interaction, counteract their social well-being. These traits can often lead other people to perceive them as odd, obscure, irritating or naive, even though in most cases their motives seem to be kind and innocent or their utterances may have a logical explanation, if one considers them from an unconventional point of view frequently revealed by them. Thus, very often, the more they struggle to approach and make friends, according to their desire, the more they keep them away, usually finding a socially non-accepted way of accessing others, such as by getting too close to them, hugging them without their permission or asking them something in a manner regarded unnatural or offbeat. Unsurprisingly, the outcome is usually disappointing and they can, as expected, often find themselves overwhelmed with feelings of rejection, frustration, anxiety,

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[2] Instead of the term "social imagination", Happe and Ronald (2008) use the term "flexible imaginative functions".

[3] "The interests or preoccupations of individuals with Autism Spectrum Disorder that become unusual in their intensity and/or focus" (Boyd, Conroy, Mancil, Nakao, & Alter, 2007).

loneliness, futility and, in the worst cases, depression (Farrugia & Hudson, 2006).

Taking into consideration the main difficulties individuals diagnosed with Asperger's demonstrate, namely unnatural and pragmatically inappropriate language use, as well as inadequacy in interacting and communicating with other people effectively, the author of this paper hypothesizes that a digitally applied task-based learning would be significantly helpful for this target group.

2. Computer-mediated task-based learning and its relevance for people with Asperger's syndrome

2.1. Task-based learning and its benefits for people with Asperger's syndrome

Tasks intended to support people with Asperger's are not supposed to focus exclusively on the development of pragmatically appropriate and natural language which seems to be the pivotal concern in language education of Asperger's sufferers (see 1.1). They can also elaborate on the development of social skills and socialization for this special population, where appropriate language is viewed an essential tool contributing to their achievement, i.e. a means to an end rather than the end in itself. Therefore, we argue that the task-based approach applied in the case of learners with Asperger's is an extension of task-based language learning and could be referred to as task-based training.

Task-based language learning is rooted in educational theories that emphasize the importance of learning through experience (Lai & Li, 2011). Most linguists tend to agree that such experiential learning is accomplished through meaningful and purposeful interaction, as well as personal engagement (Littlewood, 2004) with authentic or real-like problems (Samunda & Bygate, 2008). In the former case it fosters language acquisition, whereas in the latter in helps develop intuitive understanding (Samunda and Bygate, 2008, drawing on Bruner). In task-based learning, language is intended to serve communicative goals (Ellis, 2000; Willis, 1996; Richards, 2005) and primacy is given to meaning (Ellis, 2003; 2009; Samunda & Bygate, 2008). Taking these features into consideration, task-based training for people with Asperger's seems to address two of their main challenges mentioned earlier in the paper, namely social interaction and communication. In view of this, tasks dedicated to authentic interaction and collaboration would be ideal, after learners will have engaged in controlled and semi-controlled ones first. The achievement of natural and spontaneous exchanges is where the task-training of people with Asperger's is intended to have reached its goal in the long run.

In addition, in task-based language learning, students are able to experience a wide exposure to language, without being limited to predetermined pieces of it dedicated to specific linguistic phenomena to be explored in separate units. The latter would result in unnatural language use and, consequently, it would not be helpful for people with Asperger's who are prone to use language unnaturally. Therefore, what seems essential for them in order to

internalize natural language use, is to be presented with abundant stimuli of authentic or realistic[4] (Stern, 1992) interactions to watch, imitate or, later, engage in, relating their own linguistic and personal experiences to the tasks to be accomplished. Taking this into account, part of their training by means of tasks can involve modeling pragmatically appropriate/natural conversations with specific scenarios in particular settings[5], sometimes juxtaposed to the respective inappropriate ones, in order to draw their attention to the kind of utterances which are socially accepted. Then, queries and concerns can be addressed by explaining why the digitally presented conversations are considered suitable or not. Modeling appropriate dialogues at a first level may be followed by applying the indicated way of communicating in a scaffolded way at a second level and in an authentic way in the long run.

Another reason for using the task-based approach in the case of people diagnosed with Asperger's is that, although they are competent in memorizing rules about what kind of behavior is considered appropriate (Dautenhahn, 2000), they find it difficult to apply what they have learnt in theory, to real life situations (Kerr, 2002) or to transfer this knowledge to similar circumstances. Thus, learning through personal involvement, namely by problem solving, decision making, reasoning, creating, or whatever the focus of the task is, gives them the opportunity to internalize more intensely the experience gained from the task in question, so that they can activate it in real life. This, in turn, aids them in establishing healthy relationships with other people, as well as meeting everyday social challenges. Therefore, tasks such as making decisions on "what path to follow" and "what words to choose" in virtual reality settings, personally engaging in narrating stories scaffolded by multimodal hints, as well as criticizing interactions and behaviors digitally presented, are intended to assist them in making a smooth transition from a digital context to the real world.

Insights derived from sociocultural theory reinforce the justification of task-based training for people with Asperger's. More specifically, Ellis (2000) points out the importance of reaching a desirable task outcome taking advantage of intersubjectivity. By means of intersubjectivity, the "scaffolding" provided to these learners first by an expert and, at later stages, by their peers, is likely to result in the production of appropriate language use, demonstrating a gradually increasing competence in social skills and the ability to socialize successfully. Intersubjectivity is generally well reflected in collaboration among learners, which studies have proven to be beneficial for people with Asperger's syndrome (Bauminger-Zviely, Eden, Zancanaro, Weiss, & Gal, 2013). In particular, as demonstrated in McDowell' s research (2015), by means of collaborative tasks, people diagnosed with Asperger's seem to shift focus on themselves to focus on the others, something that targets the root of autism. By working together collaboratively to perform a task, learners become focused on the required language

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[4] Sometimes authentic input needs to be adjusted to the learners' level in order to be comprehensible. Since it cannot always be authentic, at least it should be realistic/real like.

[5] Referring to "setting", we mean the context where an interaction takes place. Referring to "scenario", we mean the plot, i.e. what happens in the setting. For example, the setting could be "at the restaurant" and the scenario "a clumsy waiter causing problems to the customers".

and procedure leading to the completion of the task, as well as tolerant of the others' points of view, wishes, feelings and task contributions for the sake of their shared purpose. This means that they become urged or positively "forced" to produce appropriate, tactful, effective and coordinated language to solve a problem, to create a product of any kind or to play a game together with others. What is more, tasks based on collaboration have the potential of bringing people together, so they might function as a good pretext aimed at helping learners establish desired human relationships, by getting acquainted with peers sharing similar needs, concerns, dreams or interests.

Controlled computer-mediated tasks -as a starting point- do not contradict the rationale of a task-based approach, as it could be superficially assumed. Although some controlled tasks seemingly give the impression of a computer-led conventional instruction, this does not have to be the case. As Littlewood (2004) claims, in task-based learning, tasks that focus on language form and those focusing on meaning do not constitute a dichotomy, but rather a continuum along which learners are gradually led to the utmost goal to be achieved, authentic communication, by engaging in "differing degrees of focus on form and meaning" (2004, p. 321). Expanding on this, we could argue that the provision of the right input focusing on language form or socially expected conventions and behavior included in controlled tasks will set the foundation for an upcoming effective interaction. Supplementarily, according to Ellis (2003), the educator can "incorporate a focus on form into the performance of the task" and, it could be added, into the content of the task as well. Referring to the case of learners with Asperger's, the instruction of language or behavior forms can be provided via meaningful controlled computer-mediated tasks, that will constitute a reasonable starting point leading to further training via tasks mainly focusing on authentic interaction and collaboration.

2.2. Computer-mediated task-based learning and its benefits for people with Asperger's syndrome

Numerous researches (Millen, Edlin-White, & Cobb, 2010; McDowell, 2015; Ramdoss, Machalicek, Rispoli, Mulloy, Lang, & O'Reilly, 2012) have demonstrated that computer-mediated remedy interventions can help people with Asperger's by addressing their difficulties in language use and socialization, either on their own or in combination with face to face individual or group tutoring. Linking this realization with the one that task-based learning is beneficial for them (2.1), leads the author of this paper to believe that computer-mediated task-based learning constitutes a powerful approach that can enhance the effectiveness of their education.

First of all, computers and the related multimodality[6] they offer, tend to be very appealing to individuals with Asperger's. Studies as well as parents' and therapists' reports have often brought into attention that autistic people display an affinity for virtual settings (Hardy,

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[6]A state including many ways or modes in which something exists or is done. In our case, for instance, digital contexts make use of sound, image and/or text.

Ogden, Newman, & Cooper, 2016; Goldsmith & LeBlanc, 2004; Murray, 1997). This could be explained by the fact that visual, acoustic and verbal stimuli are combined in alternative and interchangeable ways awakening all senses and, thus, have the potential to make learning more fun and attractive of attention and interest. Therefore, learners are likely to be more responsive and focused when engaged in computer-mediated tasks, in comparison with conventional tutoring in which they commonly find themselves abstracted or disengaged.

Another reason could be that people on the autism spectrum think mainly by making use of visual and auditory schemata, which is in accordance with the way they are mainly supposed to interact in a digital environment (Charitos, Karadanos, Sereti, Triantafillou, Koukouvinou, & Martakos, 2000). Thus, we can infer that the experiences gained by engaging in computer-mediated task-based learning are intensified and vividly imprinted in their mind, so they are more likely to be transferred and applied to the real world.

In addition, clicking as well as dragging and dropping seem more enjoyable and relaxing than handwriting for learners with Asperger's, especially for young children who may experience graphomotor[7] difficulties (Klin, Volkmar, & Sparrow, 2000) or simply get stressed and suppressed when forced to handwrite. Learning does not have to be mediated solely by handwriting (Klin, Volkmar, & Sparrow, 2000). Learners can use the computer instead, in order to acquire the expected knowledge until they start to feel more comfortable with obeying to the rules of handwriting, such as keeping the letters the same size, being attentive to the margins e.t.c., which can happen at a later age. Controlled interactive tasks with immediate digital feedback seem to be much more helpful for them, in that they are easier to handle and perform, as well as more engaging, especially if their content is carefully selected to be meaningful and purposeful for them.

What is more, virtual reality environments can cater for social skills development by offering a wide range of settings in which agents are supposed to make decisions upon what "route to follow", something that, in turn, determines what social skills and subsequent language to deploy in order to "make progress on the journey". These similarities between virtual and real environments aid in the generalization and transfer of the desirable behavior and the language accompanying it (Bellini, Peters, Benner, & Hopf, 2007; Gresham, Sugai, & Horner, 2001), to real and unpredictable circumstances.

Moreover, by applying task-based training digitally, especially in the case of virtual reality environments, social skills and appropriate language use are practiced in safe, forgiving and patient contexts (Charitos et al., 2000; Parsons, Beardon, Neale, Reynard, Eastgate, Wilson, Cobb, Benford, Mitchell, & Hopkins, 2000), so that learners do not have to experience the consequences of their potential mistakes, such as embarrassment, exposure or rejection. Additionally, computer-mediated tasks promote authentic interaction and collaboration in a fruitful and less threatening way. The asynchronicity of responses, in certain cases combined

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[7] Relating to or affecting movements made in writing (Merriam Webster dictionary).

with negotiation of meaning, gives learners the opportunity to produce language more attentively and, thus, appropriately, effectively and critically, so it is likely to increasingly help them become to-the-point interlocutors. Also, since individuals with Asperger's have proven to demonstrate sensory-perceptual abnormalities (O'neill & Jones, 1997), the load of multi-sensory information they receive in face-to-face contact tends to be overwhelming for them (Rajendran & Mitchell, 2000). More specifically, their high sensory sensitivity to audio input (Atwood, 2000) makes it hard for them to concentrate when multiple audio stimuli are intermingled. This difficulty is aggravated due to their need to process and analyze the aural input they receive (McDowell, 2015) in order to react to it effectively. Thus, we can imagine that it would be harder for them to respond successfully to the demands of a face to face interaction, especially when it involves a group work or discussion (McDowell, 2015). In addition, as displayed by Benford and Standen (2009), the lack of awkwardness often revealed in face to face contact by Asperger' s sufferers through odd prosody combined with unnatural body and facial expressions, as well as the online anonymity and the possibility to respond to messages more carefully, enable them to project a better, less misunderstood self. In other words, they are given "the opportunity to enjoy a more socially valued subjectivity and a more positive identity" (Bowker & Tuffin, 2007). This is likely to increase their self-confidence and, consequently, their sociability. Synchronous interaction seems to be more stressful and, thus, less preferable (Benford & Standen, 2009) than asynchronous for individuals with the disorder under investigation. However, it alleviates them from the problems encountered in face to face interaction, as described above, even in cases when they "talk" simultaneously with many people in a chat room. An additional privilege is that people chatting online always have the possibility to control their availability (Benford & Standen, 2009) to their online interlocutors, that is to quit a conversation or regulate their participation in it in cases when it seems to intrude their personal space or simply irritate them for any kind of reason.

Last but not least, by interacting with online peers (both those diagnosed with the same disorder and typically developing ones), learners with Asperger's can be stimulated to become truly interested in their interaction, as the last can extend a language or skills practice and become authentic and meaningful communication with another human or humans. Therefore, the desirable outcomes, namely fulfilling and effective interaction reached via computer-mediated tasks, may linger after their performance and take a lifelong dimension. In this case, the digital world is not only supposed to offer learners cognitive support by providing them with language and social skills training, but, equally importantly, it may compensate for the feelings of loneliness and disappointment caused by the real world, where they often find hard to fit in. Having online friends is preferable to having none, and virtual "buddies" can possibly become real ones. Whatever the situation is, they are given the opportunity to communicate on equal terms with typically developing people, or to share feelings, worries and dreams with people demonstrating a similar way of thinking, as well as similar strengths, weaknesses and needs. In the latter case, carrying out tasks based on authentic interaction and collaboration may result in the creation of an "online family" among people with Asperger's,

whose members can feel "at their digital home", where they can be better understood and related to, receiving and offering emotional and practical support (Dekker, 1999). Finally, computer-mediated collaborative tasks can reveal special capacities and talents which might otherwise be misunderstood or remain hidden.

Conclusion

On the whole, taking into consideration the nature of Asperger's syndrome, the benefits gained through task-based learning and computer-mediated remedy interventions for people with Asperger's, as well as the affinity that people on the autism spectrum feel for digital environments, the author of this paper claims that computer-mediated task-based learning is especially opportune to create desirable learning conditions for this special population.

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