Stuck on you: Face-to-face arousal and gaze aversion in Williams syndrome

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Abstract

Introduction: During face-to-face questioning typically developing children and adults use gaze aversion (GA), away from their questioner, when thinking. GA increases with question difficulty and improves the accuracy of responses. We investigate whether individuals with Williams syndrome (WS), associated with hyper-sociability and atypical face gaze, use GA to manage cognitive load and whether physiological arousal is associated with looking at faces. **Methods:** Two studies were conducted by: i) Recording changes in the participants' skin conductance levels whilst manipulating task difficulty and gaze direction and ii) Calculating the amount of GA away from the experimenters' face whilst answering questions of varying difficulty. **Results:** In study 1, whilst WS was associated with general hypo-arousal, face arousal effects were found for both Williams syndrome and typically developing participants. In study 2, participants with WS showed prolonged face gaze under high task demands, however question difficulty did increase GA. **Conclusions:** Looking at faces is demanding, even for individuals with WS. Decreased physiological arousal may allow individuals with WS hold face gaze for prolonged periods of time, but looking at faces does increase baseline arousal level. The results are discussed in terms of social skills training and teaching methods appropriate for WS.

Stuck on you: Face-to-face arousal and gaze aversion in Williams syndrome

Williams syndrome (WS) is a genetic disorder arising from a microdeletion of approximately 25 genes at chromosome site 7q11.23 (Donnai & Karmiloff-Smith, 2000). Previous research has mapped the distinct neuropsychological profile associated with WS, showing strengths and weaknesses of cognitive ability across verbal and nonverbal domains of processing (Bellugi, Wang & Jernigan, 1994, Bellugi, Lichtenberger, Jones, Lai, & St George, 2000). Interest in the social phenotype associated with WS has increased exponentially over recent years with suggestions of subtle atypicalities, defined as 'hyper-sociability' (Jones et al., 2000, Doyle, Bellugi, Korenberg, & Graham, 2004) or a 'pro-social drive' (Frigerio et al., 2006). Individuals with WS are often characterised as overfriendly and unreserved with both familiar and unfamiliar people (Gosch & Pankau, 1997). Children with WS rate unfamiliar faces as more approachable than children with other disorders of development (Jones et al., 2000), especially when they show a happy expression (Frigerio et al., 2006) and when engaged in social interactions toddlers with WS show intense looking behaviour towards faces (Mervis et al.., 2003).

Due to the social relevance of interpreting communicative facial cues and the interest that individuals with WS show in looking at faces, behavioural studies have explored face perception with the aim of understanding interpersonal communication. Research suggests that although individuals may appear relatively proficient at recognising faces (Bellugi et al., 2000) they exhibit a range of atypicalities regarding structural encoding (Karmiloff-Smith et al., 2004) and specifically the encoding of familiar faces (Riby, Doherty-Sneddon, & Bruce, 2008a). Within a profile of skills across disorders of development, individuals with WS show

significantly more competence at interpreting cues of eye gaze and expressions of emotion when compared to individuals with autism (Riby, Doherty-Sneddon, & Bruce, 2008b). The difference in interpreting communicative facial cues is likely to contribute to the socio-cognitive differences shown by individuals with WS and those with autism (Brock, Einav & Riby, 2008). Indeed individuals with WS appear relatively proficient at reading simple and complex mental states from the eye region (Tager-Flusberg, Boshart, & Baron-Cohen, 1998), a problem that is difficult for those with autism (Baron-Cohen, Leslie, & Frith, 1986).

Recent eye-tracking investigations have shown that when individuals with WS look at static pictures of people in social situations (e.g. pictures showing characters chatting to their friends, or making lunch) they spend longer looking at actors' faces than participants who are developing typically (Riby & Hancock, 2008). Increased fixation duration is particularly apparent towards the eye region of characters, linking to claims of prolonged face gaze and eye contact (Mervis et al., 2003). This finding is replicated when individuals with WS watch movies containing humans, but not when watching cartoons (Riby & Hancock, 2009). Eye-tracking research therefore corroborates suggestions that the gaze behaviour of individuals with WS is atypical, evidenced by increased and prolonged face and eye fixations towards human faces. Current explanations for the occurrence of hyper-sociable behaviour (and exaggerated face gaze) focus on a number of possible contributors. The role played by the amygdala (e.g. Jawaid, Schmolck & Schulz, 2008) has attracted research attention due to abnormalities of structure and size (Reiss et al., 2004) in individuals with WS. The important role of the amygdala in processing information related to emotion and its link to socio-emotional functioning is crucial here. Plesa-Skwerer, Verbalis, Schofield, Crawford, Ciciolla and Tager-Flusberg (2009) explored autonomic responsiveness to facial expressions of emotion. Whilst individuals with WS watched short dynamic clips of actors expressing

emotional states galvanic skin response was recorded as a measure of autonomic responsiveness. Individuals with WS showed reduced arousal (hypo-arousal) in comparison to typically developing participants. The authors link this finding to the possible implications of atypical structure and functioning of the amygdala, given its role in mediating the autonomic nervous system. Interestingly, these results appear when individuals with WS are looking at images of faces on a computer screen, rather than engaging with another person. Therefore extrapolating this type of research to real-life interactions would be particularly beneficial and may reveal more about the implications of atypical amygdala functioning and its relationship to autonomic responsiveness in natural interactions.

The second hypotheses for explaining to WS social phenotype is the involvement of atypical inhibitory control / attention processes (e.g. Porter, Coltheart, & Langdon, 2007, Cornish, Scerif & Karmiloff-Smith, 2007) which may not only allow faces to capture attention in an atypical manner, but may also relate to how attention is shifted or disengaged from socially relevant information. Currently however, the exact contribution of these factors remains unclear and indeed their contribution may not be mutually exclusive. Understanding not only the source of atypical social behaviour, but the exact nature of this behaviour is particularly important for understanding and appropriately teaching social skills to individuals with WS. Differences in the way that individuals with WS engage in social communication during face-to-face contact may explain difficulties with peer relations and associated social anxieties (e.g. Laws & Bishop, 2004), irrespective of the empathetic nature of individuals with the disorder (Gosch & Pankau, 1997).

While face-to-face signals, like eye gaze and facial expressions, are beneficial to communication, they carry a cognitive load which typically developing children and adults

avoid by averting their gaze (e.g. Doherty-Sneddon Bruce, Bonner, Longbotham, & Doyle, 2002). Furthermore making and holding direct eye contact with another person influences physiological arousal (linking to the work previously mentioned by Plesa-Skwerer and colleagues), leading to increased heart rate and skin conductance (e.g. Gale, Lucas, Nissim & Harpham, 1972, Kleinke, 1986, Andreassi, 2000, Argyle & Cook, 1976). Some researchers claim that one reason we avert our gaze is to reduce heightened physiological arousal caused by prolonged mutual gaze (e.g. Field, 1981). The first aim of the current research is to begin exploring the effect of direct eye contact on physiological arousal in a small group of individuals with WS. The previous work of Plesa-Skwerer and colleagues (2009) is particularly informative here but working with actual inter-personal situations would further advance our understanding of arousal and gaze behaviour in WS. The previous eye-tracking evidence has also emphasised the face gaze atypicalities shown by people with WS (Riby & Hancock, 2008, 2009), but again the inter-personal conditions created in the current research will extrapolate these findings to more naturalistic social interactions. It is hypothesised that individuals with WS will show less arousal to faces (hypothesis 1). In addition we predict that individuals with WS will avert their gaze less overall (hypothesis 2) and will not use GA in response to increasing cognitive difficulty of questions (hypothesis 3).

Study 1: Face-to-face arousal effects

Method

Participants

Fifteen individuals with Williams syndrome participated[1], ranging from 8 years 10 months to 28 years 2 months (mean 14 years 11 month). All participants were recruited through the Williams syndrome Foundation. Parental and participant consent was received prior to testing. Eleven participants had previously had their diagnosis confirmed with the fluorescent in situ hybridisation diagnostic test (FISH), whilst the remaining four had been diagnosed phenotypically by clinicians. Three participants had to be removed from the study, one participant was unable to answer the mathematics questions and two were unable to remain still for the GSR measurements. Therefore the final sample comprised 12 participants (6 female, 6 male, 11 participants with positive FISH tests) aged 10 years 2 months to 28 years 2 months (mean 17 years 6 months).

To compare physiological arousal to that of typically developing individuals, a comparison group of 12 participants was recruited and matched to each participant with WS on the basis of chronological age[2]. There was no difference in the chronological ages of the two groups (*p*=.48). The group with WS had a mean age of 17 years 7 months (as detailed above) whilst the typically developing group also had a mean age of 17 years 7 months (ranging from 10 years 4 months to 28 years 4 months).

Stimuli and Procedure

Participants completed 3 levels of task difficulty (no task; easy mental arithmetic- e.g. 'count from 1-15 in 1s'; difficult mental arithmetic- e.g. 'count backwards from 100 in 3s') while

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[1] This small sample size is adequate in respect to other studies of individuals with this rare genetic disorder in the UK and for the aim of providing pilot data for future investigations of arousal in WS. The sample size is also comparable to studies investigating the gaze behaviour of children with other developmental disorders such as Fragile X syndrome (e.g. n=6, Hall et al., 2009).
[2] In study 1 we are measuring physiological arousal which is documented in the literature as changing in relation to chronological age with younger children being more physiologically responsive than older children and adults (e.g. Venables & Mitchell, 1996). Hence it was important to have a chronological age matched control for this physiological study.

looking towards the experimenter or at the floor (18 trials in total, order counterbalanced). Task difficulty was individually adjusted as necessary for each participant (see Paterson, Girelli, Butterworth, & Karmiloff-Smith (2006) on mathematics ability in WS). The calibration of difficulty was done a priori for all participants with WS in collaboration between the experimenter and the parents/guardians/teachers of the WS participants. However if a participant found a particular task unexpectedly challenging/easy this was altered or moved to a different category of difficulty as appropriate. For example, instead of counting backwards in 3s the participant may have counted backwards in steps of 2 or 1 depending on their individual capability.

Physiological arousal was measured by recording changes in the participants' skin conductance levels. Silver/silver chloride electrodes filled with gel were placed on the medial phalanges of the middle and index fingers of the participant's hand and connected to a Biopac MP30 amplifier. The data were recorded and displayed in microSiemens (μSiemens). The mean skin conductance level (SCL) for each trial was calculated. After each trial, there was a rest period of 30-40 seconds in order that SCL levelled off before commencing the next trial.

Results

An ANOVA was conducted on the mean SCL data. Group (WS, TD), Condition (Face, Floor) and Difficulty (easy, difficult, no task) were the independent variables. Means are given in Table 1. There was a significant effect of Condition, $F(1,22) = 21.03$, $p < .001$, $\eta_p^2 = .49$, with arousal significantly higher while looking at the face compared with the floor (mean face arousal $= 6.78$, mean floor arousal $= 6.03$). There was a significant effect of Group,

$F(1,22) = 29.60$, p < .001, $\eta_p^2 = .57$, as individuals with WS showed lower SCL levels than those who developed typically (mean WS = 4.18, TD = 8.63). There was a significant effect of Difficulty, $F(2,44) = 16.43$, p <.001, $\eta_p^2 =.43$ (mean easy = 6.37; mean difficulty = 6.65; mean no task = 6.20). Post hoc t-test revealed that participants had higher SCL scores when doing difficult tasks compared with both easy tasks and no tasks (t(47) = 3.25, p <.01; t(47) = 5.41 , p <.001). In addition participants had higher SCL when engaged on easy task compared to no tasks, t(47) = 2.20, p <.01. There was a trend to significance for the interaction between Group and Condition, $F(1,22) = 3.83$, p = .06, $\eta_p^2 = .15$. While this is a small effect size the interaction has a direct bearing on our first hypothesis and hence planned comparisons t-test were used to explore it. These revealed that the effect of Group was significant in both the face and the floor conditions (t(22) = 5.75, p < .001, mean WS = 4.40, mean TD = 9.17; t(22) = 4.92, p < .001, mean WS = 3.96, mean TD = 8.10). Condition was significant for the typical developing participants (t(11) = 4.53, p <.001, mean face = 9.17; mean floor = 8.10) and there was a trend to significance for the WS participants (t(11) = 1.90, p = .08, mean face = 4.40; mean floor = 3.96).

[Insert Table 1]

Discussion

Individuals with WS were generally less physiologically aroused than age-matched typically developing individuals, with typically developing individuals showing around double the SCL. In addition both groups were more aroused when looking at faces (mean WS = 4.40; mean TD = 9.17) than the floor (mean W = 3.96; mean TD = 8.10), albeit the effect is marginal for the WS group. So contrary to our prediction faces were arousing for participants with WS although baseline levels of arousal were very low for this group in comparison to

matched controls. The results may help explain (although there are likely many other factors involved) the anomaly in the WS literature that while people with WS are people orientated (Klein-Tasman & Mervis, 2003), relatively good at processing some aspects of faces (e.g. eye gaze cues, Riby et al., 2008b), and preferentially attend to faces for prolonged periods of time (Riby & Hancock, 2008, 2009; Mervis et al., 2003), they seem immune to the 'overload' associated with extensive eye contact. Using an assessment of physiological arousal it is possible to reveal that one of the important components of extended face gaze in WS is likely to be the effect of arousal level during social interactions and communication.

Study 2: Gaze aversion while thinking

Method

Participants

The WS group from study 1 took part. A new typically developing comparison group was recruited and individually matched on gender and verbal mental age to the participants with WS[3]. They had a mean chronological age of 9 years 4 months (ranging 5 years 4 months to 16 years 8 months). Verbal ability was assessed using the BPVS II (Dunn, Dunn, & Whetton, 1997), with participants with WS having a mean receptive vocabulary age of 8 years 11 months (ranging 4 years 7 months to 16 years 6 months) and typically developing participants 9 years 2 months (ranging 4 years 10 months to 16 years 11 months). There was no difference

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[3] The rationale for having a VMA matched control group in study 2 is because it examines gaze aversion behaviours during problem-solving. Abilities and strategies for problem solving are strongly linked to cognitive development and functioning, hence why a VMA match was taken. Furthermore GA increases with age (e.g. Doherty-Sneddon et al 2002) over the early primary years with most typically developing 8-year-olds behaving much like adults. Controls were around 8-years of age and we would therefore not expect them to differ much in terms of their GA behaviours from an adult chronologically matched control group. However because of the nature of the problem solving activity involved in study 2 we considered it important to have a mental age control.

between the groups on the basis of verbal ability (p=.13), [4] although the participants with WS were significantly older than those who were developing typically (t(11)=9.41, $p<.001$).

Stimuli and procedure

Naturally occurring gaze aversion was recorded during a question and answer session. Participants completed 9 mental arithmetic questions in easy, medium and hard conditions with the order randomised (total 27 questions that were individually tailored to the participants' ability). The calibration of difficulty for all participants with WS was done a priori in collaboration between the experimenter and the parents/guardians/teachers of the WS participants. However if a participant found any items unexpectedly challenging/easy, items were changed or moved to a different category of difficulty as appropriate. For example if counting up in steps of 2 was deemed to be of moderate (as opposed to easy) difficult the experimenter would have changed its category and added counting up in steps of 1 to the easy category. The experimenter looked at the participant throughout each trial. A video-camera recorded the participants' gaze for subsequent analysis. Gaze aversion was coded during 'thinking' – the time from the experimenter finishing asking a question to the participant beginning their answer – and analysed as a percentage of the total time used for thinking (cf. Doherty-Sneddon et al., 2002). An independent coder coded 10% of the data. Their coding of the incidence of GA agreed with the original coder's classification in 90% of incidences.

Results

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[4] Although the groups were matched on the basis of verbal ability, the difficulty of each assessment was individually manipulated for each participant. This is particularly important for the different degrees of ability of the participants with WS and the dissociation between verbal and nonverbal abilities.

GA data

A 2-way ANOVA was carried out on the GA data with factors Group (WS, TD) and Task Difficulty (easy, medium or hard questions). The percentage of thinking time spent averting gaze was the dependent measure. This revealed that Task Difficulty had a significant impact on the amount of GA participants engaged in, $F(2,44)= 208.09$, $p<.001$, $\eta_p^2 = .90$ (mean percentage easy = 25.58; mean medium = 51.63; mean hard = 70.79). Group also had a significant effect on GA, $F(1,22) = 8.86$, $p <.01$, $\eta_p^2 = .29$ (mean WS = 41.81, mean TD = 56.86). There was a significant interaction between Group and Task Difficulty, $F(2,44) = 27.13$, $p<.001$, $\eta_p^2 = .55$ (means given in Table 2). Although individuals with WS and those developing typically did not differ in their levels of GA during the easy phase (p=.65), individuals with WS spent significantly less time averting their gaze during the medium phase ($t(11)=3.39$, p<.01) and the hard phase of questioning ($t(11)=5.61$, $p<.001$. Importantly both groups increased their gaze aversion as a factor of task difficulty (WS $F(2,22)= 37.54$, $p<.001$, $\eta_p^2 =.77$; TD $F(2,22)=227.69$, $p<.001$, $\eta_p^2 =.95$).

[Insert Table 2]

Accuracy

An ANOVA was conducted with the percentage accuracy of responses with factors Task Difficulty (easy, medium, hard) and Group (WS, TD). Task Difficulty had a significant impact on response accuracy, $F(2,44) = 291.338$, $p<.001$, $\eta_p^2 = .93$. There was no effect of

Group (p=.21) and no significant interaction between Task Difficulty and Group (p=.88). See Table 2.

Discussion

Participants with WS did not differ in their level of GA compared with typically developing individuals when answering easy questions, however when questions were more challenging (moderate and difficult) participants with WS averted their gaze significantly less. Thus participants with WS did engage in more face gaze compared with typically developing individuals during challenging concurrent activities, supporting claims of over-gazing and prolonged face fixations (e.g. Mervis et al., 2003, Riby & Hancock, 2008, 2009). Importantly this had no negative impact on response accuracy of questions asked of them. Earlier work with typically developing children has found that 'excessive' gazing can cause task interference effects (Doherty-Sneddon, Bonner, & Bruce, 2001, Doherty-Sneddon, McAuley, Bruce, Langton, Blokland, & Anderson, 2000). It is important to highlight that there was no difference between the WS and control in terms of levels of response accuracy during the GA paradigm nor was there any interaction. This is what we would expect given that the level of task difficulty was carefully calibrated in both groups. The lack of group difference and interaction clearly shows that task difficulty was equivalent across groups and the increase in difficulty was equivalent across groups. The current work supports the only study in the literature documenting exaggerated face gaze in real life situations in WS, and that was with toddlers in social encounters (Mervis et al, 2003). The results also support evidence of individuals with WS spending prolonged periods of time gazing at faces when they are shown on computer screens (Riby & Hancock, 2008, 2009). Our results show that exaggerated face gaze occurs during natural problem solving interactions in WS, not only social encounters. Of

course it is possible that WS participants see all encounters as social. However the problem solving paradigm was genuinely engaged in by the participants (evidenced by their level of performance) and was inherently more structured than a 'social' interaction.

Although participants with WS use less GA than typical controls during conditions of moderate to difficult mental challenge, they do increase GA as question difficulty increases. So people with WS are not simply 'stuck' on faces, like typically developing individuals they manage their cognitive load by looking away more when task demands require them to do so. This behavioural characteristic may be particularly important when teaching individuals with WS, whereby teachers should be aware of the nature of WS gaze behaviour and how this may differ from pupils who are developing typically or indeed those with other disorders of development.

Conclusions

The current research has explored the nature of gaze behaviour associated with WS in person – to – person interactions, emphasising the role played by physiological arousal and the effect of cognitive load on the occurrence of gaze aversion. There are a number of possible explanations for the current findings that must be considered. Extended eye contact or face gaze by individuals with WS during cognitively demanding scenarios may be related to the feature-based encoding of faces that is used by adults as well as children (e.g. Karmiloff-Smith et al., 2004). Encoding individual features rather than the overall facial configuration may mean that faces are encoded more slowly than typically occurs and hence places less of a cognitive load. This may allow individuals with WS to engage with / study faces for longer period of time without the concomitant negative effects on cognitive processing found in

typical development. Recording naturally occurring gaze behaviour (fixation scanpaths) while individuals with WS hold face gaze (in person rather than presented on a computer screen) may reveal whether this interpretation is plausible.

The results of the current research must also consider the role played by attention and disengagement mechanisms in the face gaze of individuals with WS. Attentional disengagement difficulties have been proposed when exploring the performance of toddlers with WS on selective attention measures (Cornish, Scerif, & Karmiloff-Smith, 2007, Scerif, Cornish, Wilding, Driver, & Karmiloff-Smith, 2004) and spatial attention paradigms (Brown et al., 2003). Recently, Porter et al. (2007) have proposed that the characteristic social approach that typifies WS is related to poor response inhibition and frontal lobe dysfunction. Individuals with WS may be unable to disengage their attention or inhibit socially salient information. However, the current research suggests that attention can be disengaged from faces, indeed when concurrent task demands are low this is done in a typical manner. Complexities of disengaging attention away from the face are more prevalent when concurrent task demands are high and this is exhibited as prolonged faze gaze and a relatively low gaze aversion level in contrast to typically developed individuals. Interestingly even though this is the case, an increase in gaze aversion associated with increasing cognitive load is still evident. The exact contribution of attention mechanisms in this behaviour remains unclear.

Another candidate mechanism involved in the typical WS social phenotype is the amygdala (Jawaid et al., 2009; Plesa-Skwerer et al., 2009). Important to the current research is the fact that the amygdala participates in autonomic activity, such as skin conductance responses (SCR, Critchley, Mathias, & Dolan, 2002). Co-activation of amygdala and arousal systems is

thought to enable the cortex to distinguish between fear signals and other arousal responses to novel stimuli (Damasio, 2000). It has been proposed that there is a link between individuals with WS rating faces as less 'fearful' or more approachable and dysregulation of the amygdala (e.g. Plesa-Skwerer et al., 2009). In a similar vein, the fact that individuals with bilateral amygdala lesions are able to generate SCR to certain stimuli becomes relevant to the current research when we note that the magnitude of SCR is diminished in patients with lesions (Masaoka, Hirasawa, Yamane, Hori, & Homma, 2003) and those with WS. Similarly, abnormalities of the amygdala have previously been related to impaired or atypical gaze behaviours during conversations and natural social interactions (Spezio, Huang, Castelli, & Adolphs, 2007). Recent research by Plesa-Skwerer and colleagues (2009) emphasises the possible role of the amygdala in their finding of atypical autonomic responsiveness to expressive faces shown on a computer screen. The current study extrapolates such behaviour to a real life situation whilst supporting an amygdala theory of WS (relating to atypical dysregulation and the possibility of atypical connectivity, see Meyer-Lindenberg et al., 2005).

Although the current research is not able to elucidate the exact nature of mechanisms underlying the WS social phenotype, it is possible to provide further understanding of the nature of gaze behaviour for this population. Future research would benefit from a clearer understanding of the neuroscience underlying the social characteristics associated with WS and the current research plays an important part in characterising the observable features of gaze behaviour.

Importantly, the results show that in WS, as in typical development, GA is indicative of cognitive load and thinking. These results have potentially important implications for our understanding of the social functioning of people with WS. With further research on a larger

sample of individuals with WS, across the developmental spectrum, it may be possible to understand important components of the WS social phenotype. Importantly, the results can also inform practice with this group and link to other populations associated with developmental disorders and atypicalities of face gaze (e.g. autism, Willemsen-Swinkels, Buitelaar, Weijnen, & van Engeland, 1998, Fragile X syndrome, Hall, Maynes & Reiss, 2009). Parents and teachers of Williams syndrome are already given advice on how to deal with aspects of their child's hypersociability (see e.g. The Williams Syndrome Foundation website). Some of this includes suggestions about social skills training including using modelling and role play to teach people with WS not to stand too close to others or to stare. This is of course important to ensure that intimacy distance rules are kept (e.g. Doherty-Sneddon & McAuley, 2000) but will also be important in facilitating turn-taking- "if I look away I show that I'm still thinking and not ready to relinquish my turn, and if someone else is speaking and does the same I have to wait". Future research should examine the potential benefits of encouraging GA while thinking about challenging material, or during conversational encounters, in this and other populations.

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Author notes

Table 1: Mean skin conductance level in each task condition in Study 1(in µSiemens).

Standard deviations in parentheses.

	FACE			FLOOR		
	easy	*difficult*	*nothing*	*easy*	*difficult*	*nothing*
WS	4.41	4.56	4.22	3.97	4.21	3.71
	(1.76)	(1.62)	(1.46)	(1.96)	(2.10)	(1.92)
TD	9.07	9.58	8.87	8.04	8.26	7.99
	(2.29)	(2.54)	(2.45)	(2.06)	(2.15)	(2.23)

Table 2. Percentage of gaze aversion during thinking time in Study 2 and response accuracy across task difficulty in WS and TD (standard deviations in parentheses)

	Task Difficulty		
	Easy	Medium	Hard
Percentage GA			
WS	27.22 (19.16)	41.72 (17.04)	56.43 (17.75)
TD	24.05 (10.41)	61.47 (7.93)	85.10 (4.05)
Response accuracy			
WS	89.78(6.24)	69.33 (10.33)	28.20 (9.44)
TD	96.30 (5.47)	71.57 (13.71)	32.13 (10.02)