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Is Asperger syndrome/high-functioning autism necessarily a disability?

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Abstract
This article considers whether Asperger syndrome (AS) or high-functioning autism (HFA) necessarily leads to disability or whether AS/HFA simply leads to "difference." It concludes that the term "difference" in relation to AS/HFA is a more neutral, value-free, and fairer description than terms such as "impairment," "deficiency," or "disability"; that the term "disability" only applies to the lower functioning cases of autism; but that the term "disability" may need to be retained for AS/HFA as long as the legal framework provides financial and other support only for individuals with a disability. Two models are summarized which attempt to define in what way individuals with AS/HFA are "different": the central coherence model, and the folk psychology–folk physics model. The challenge for research is to test the value of such models and to precisely characterize the differences in cognitive style.

We have grown familiar with the idea that autism[1] is a "psychiatric condition," a "disorder," a "disability," or a "handicap." Ever since Kanner's description of the "aloneness" of these children (Kanner, 1943), psychiatry has labeled and categorized them as abnormal, ill, and deficient. Through the changing definitions of "autism" enshrined in successive editions of both the *Diagnostic and Statistical Manual* (DSM; published by the American Psychiatric Association [APA]) or the *International Classification of Diseases* (ICD; published by the World Health Organization), we have had a single view of autism thrust upon us: an essentially negative view in which children or adults with autism are characterized as "impaired" (APA, 1994).

This article challenges the received view through a subtle but important shift of emphasis. Rather than conceiving of autism as a deficiency, it instead considers if autism might be better characterised as a *different* cognitive style. This important idea can be traced to Uta Frith's book (Frith, 1989), and has been recently discussed in relation to "central coherence" theory (Happe, 1999), but deserves a fuller discussion because of the massive implications of this shift of emphasis. Using the term "different" rather than "deficient" may seem unimportant (after all, both words begin with "d" end in "t" and have seven letters in between). But this small shift could mean the difference between whether the diagnosis of autism is received as a family tragedy, akin to being told that the child has some other severe, lifelong illness like diabetes or hemophilia, or whether the diagnosis of autism is received as interesting information, akin to being told that the child is right- or left-

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1. Here, "autism" is used as short-hand for "autism spectrum conditions."

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handed. In this millennium special issue of *Development and Psychopathology,* the intention is to highlight this as an issue for the agenda.

Asperger Syndrome and High-Functioning Autism

Autism is diagnosed on the basis of abnormalities in the areas of social development, communicative development, and imagination, together with marked repetitive or obsessional behavior or unusual, narrow interests (APA, 1994). Individuals with autism may have an IQ at any level. By convention, if an individual with autism has an IQ in the normal range (or above), they are said to have "high-functioning autism" (HFA). If an individual meets all of the criteria for HFA except communicative abnormality or history of language delay, they are said to have Asperger syndrome (AS). In this paper, we focus on AS and HFA since we accept that an individual who is lower functioning necessarily has a disability in the form of retardation. What is not clear, and therefore the subject of the debate presented next, is whether individuals with AS/HFA necessarily have a disability. For the present purposes, we consider the arguments in relation to AS and HFA, without attempting to draw any distinction between these.

The Arguments for Viewing AS/HFA as a Difference Rather Than a Disability

Behavior in AS/HFA is not better or worse than that seen in typical development

If one examines the facts, attempting to be nonjudgmental about them, children with AS/HFA could be said to show the following differences, which are based on diagnostic features, except where alternative citations are given:

1. the child spends more time involved with objects and physical systems than with people (Swettenham et al., 1998);
2. the child communicates less than other children do;
3. the child tends to follow their own desires and beliefs rather than paying attention to or being easily influenced by others' desires and beliefs (Baron–Cohen, Leslie, & Frith, 1985);
4. the child shows relatively little interest in what the social group is doing or being a part of it (Bowler, 1992; Lord, 1984);
5. the child has strong, persistent[2] interests;
6. the child is very accurate at perceiving the details of information (Plaisted, O'Riordan, & Baron–Cohen, 1998a, 1998b);
7. the child notices and recalls things other people may not (Frith, 1989);
8. the child's view of what is relevant and important in a situation may not coincide with others (Frith, 1989);
9. the child may be fascinated by patterned material, be it visual (shapes), numeric (dates, timetables), alphanumeric (license plates), or lists (of cars, songs, etc.);
10. the child may be fascinated by systems, whether simple (light switches, spigots), a little more complex (weather fronts), or abstract (mathematics);
11. the child may have a strong drive to collect categories of objects (e.g., bottletops, train maps) or categories of information (types of lizard, types of rock, types of fabric, etc.); and
12. the child has a strong preference for experiences that are controllable rather than unpredictable.

The list could be expanded, but these 12 behavioral features are sufficient to illustrate that children with AS/HFA are different in ways that can be described in value-free terms: none imply any necessary disability. Rather, most of the above facts show the child as immersed in the world of things rather than people. This might be a basic way of defining the difference between a person with an au-

2. "Persistent" here does not necessarily mean for years, but certainly for extended periods of time. Typical reports describe intense interests lasting for months, but which then switch to new, equally intense topics.

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tism spectrum condition and one without it (Baron–Cohen, 2000).

Being more object focused than people focused is clearly only a disability in an environment that expects everyone to be social. But a moment's reflection highlights the injustice of this expectation. Thus, people who show the opposite pattern (of being more people focused than object focused) are not necessarily considered disabled. On this view, people with AS/HFA would cease to be disabled as soon as society's expectations change. For example, a child with AS/HFA who prefers to stay in the classroom poring over encyclopedias and rock collections during break time, when other children are outside playing together, could simply be seen as different, not disabled. It is not clear why the child with AS/HFA is seen as doing something less valuable than the other children or why their behavior should be seen as an index of impairment.

Equally, a child with AS/HFA who has strong narrow interests of an unusual nature (learning the names of every kind of bird) may be different to a typical child who has only been interested to learn the names of common animals. But surely the narrow deep knowledge is no less valuable than the broad, shallower variety, and certainly not a necessary index of deficit? A final example should help drive this point home. Just because a child with AS/HFA notices the unique numbers on lampposts which the rest of us are unaware of, does this make him impaired? We could say it is simply different. The same argument can be applied to all of the other facts listed above.

The neurobiology of AS/HFA is not better or worse than in typical development

AS/HFA involves a range of neural differences. A full review of these is beyond the scope of this article, but the reader can consult other excellent summaries (Piven et al., 1995; Piven, Bailey, Ranson, & Arndt, 1998; Piven et al., 1990). In some regions of the brain increased cell density has been found (Bauman & Kemper, 1988)—for example, in the limbic system—while in other regions of the brain the structures are reported to be smaller. For example, the cerebellar vermis lobule 7 (Courchesne, Yeung–Courchesne, Press, Hesselink, & Jernigan, 1988) and the posterior section of the corpus callosum (Egaas, Courchesne, & Saitoh, 1995) have both been reported to be reduced in size in autism. However, while these neural abnormalities signal differences between brains of people with and without AS/HFA, they cannot be taken as evidence that one type of brain is better or worse than the other.

Similarly, AS/HFA appears to be strongly familial, implying a genetic aetiology, and the first report from an international molecular genetic consortium study reported a linkage on Chromosome 7 in affected individuals (Bailey, Bolton, & Rutter, 1998). The molecular genetic basis of AS/HFA remains to be worked out in detail, but again such findings are at best evidence of difference and in no way implies that the genotype of AS/HFA is deficient.

"Difference" avoids value-laden judgments

Many features of AS/HFA may be redescribed in ways that are more neutral, in terms of AS/HFA comprising a different "cognitive style," with no implication that this is better or worse than a nonautistic cognitive style (Happe, 1999). For example, the AS/HFA cognitive style may be described as being more object oriented, and more focused on detail.[3] Another change in terminology is that

3. Temple Grandin, at the recent Geneva Centre Conference on autism in Toronto (November 1998), said "What would happen if you eliminated the autism genes from the gene pool? You would have a bunch of people standing around in a cave, chatting and socializing and not getting anything done!" This anecdote nicely illustrates that the genes for autism may lead to a different cognitive style that has enormous practical value in its own right (Baron–Cohen et al., 1998; Baron–Cohen, Wheelwright, Stott, Bolton, & Goodyer, 1997).

   A research assistant with Asperger syndrome working at Yale gave me another anecdote. He said "If we are autists, you guys are heterists. The diagnostic features of heterists are making lots of eye contact and overlooking details such as small coins on patterned carpets or car number plates." Again, this anecdote emphasizes our differences and raises the question in an amusing way about why one style should be regarded as a disability.

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the term "autistic spectrum disorders" is being replaced by the term "autistic spectrum conditions." Like the term "cognitive style," this avoids the possibly pejorative associations of the term "disorder," although it may be questioned whether even using the term "condition" is an appropriate medicalizing of an individual's cognitive style. But the spirit of such changes in terminology is clear. It is possible to describe AS/HFA in value-free ways.

The difference view is more compatible with the "continuum" concept

A further argument for favouring the difference view over the disability view is that it is easier to accommodate within the now widely accepted notion that autism appears on a continuum (Wing, 1988). The notion of a continuum assumes that there is an underlying dimension or set of dimensions along which all people vary. There is still debate over precisely what constitutes the underlying dimension. Later in the paper we consider two models that aim to characterize the autistic spectrum.

Arguments for Viewing AS/HFA as a Disability Rather Than a Difference

Differences are caused by cognitive deficits

The obvious first rejoinder to the difference argument is that children with AS/HFA show differences precisely because they are disabled, impaired, suffer cognitive deficits, and so forth. Thus, one might argue that they are less influenced by others because they cannot spontaneously stop to consider other people's points of view, feelings, and thoughts (the theory of mind deficit; Baron–Cohen, Jolliffe, Mortimore, & Robertson, 1997; Baron–Cohen, Leslie, & Frith, 1985); they may communicate less and may be less socially focused for the same reason; their unusual perception may arise because of their "weak" central coherence (Frith, 1989; Happe, 1997; Jolliffe & Baron–Cohen, 1997); while their strong interests may reflect a "failure" to switch attention flexibly, possibly as a sign of their "executive disorder" (Ozonoff, Pennington, & Rogers, 1991; Russell, 1997). For all these reasons, the rejoinder goes, we should retain the notion of AS/HFA as a disability.

This could be regarded as unfair because there may be a chicken-and-egg problem in the logic. We cannot yet prove that their difference is due to a disability and not the other way around. For example, is their "mindblindness"[4] (Baron–Cohen, 1995) the cause of them being less socially focused and more object focused, or a consequence of it? The development of a mind-reading skill may require months of social input (Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991) so a lack of early social interest could contribute to mindblindness.[5] One could make a similar case in relation to their weak central coherence: Is this a cause of their relatively greater interest in detail (Frith, 1989) or simply a consequence of it?

Lack of social interest reflects disability

Here is a second argument for seeing AS/HFA as a disability: the absence of a behavior may itself reflect a disability in that area. In this case, the lack of normal sociability or communication is seen as a sign of disability. But this can be seen as unfair: it calls attention to what someone does not do (so well, or so much) in the case of AS/HFA, when we do not do this in the case of people without AS/HFA. For example, I do not spend much, if any, time thinking about mathematics problems, but I spend quite a lot of time thinking about people. In contrast, the person in the next-door office spends a lot of time thinking about mathematics problems and hardly any thinking about people. Yet I do not describe myself as having a disability in mathematics. I would instead say that I simply prefer to spend time thinking about people: they are more interesting to me. To call what a person

4. Here, "mindblindness" (or difficulties in using a theory of mind) is not seen as an all-or-none phenomenon, but occurs by degrees.

5. Note though that there may be a genetic basis to these aspects of "social intelligence" (Hughes & Cutting, 1999), especially given how specific they are to our species.

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does little of a disability could be seen as unreasonable. It might be a little like saying that the basketball player Michael Jordan has a deficit in fine motor coordination on the grounds that he is not known for spending much (if any) time engaged in needlework. This may be true of him, but to highlight this aspect of his skills, while ignoring his obvious assets in hand–eye coordination, physical speed, strength, agility, and so forth, is to put things back to front, and would be an unfair description of him.

AS/HFA is a disability when viewed from the family or peer perspective

One might argue that AS/HFA is a disability when viewed from the perspective and needs of their family and the wider social groups (school, peers, etc.). Parents may be at their wits end over the extreme behaviors their child shows. For example, the child may insist that the living room light should be on while the hallway light should be off, that the plug switches should all be in the up position, and just certain taps should be on (Baron–Cohen & Bolton, 1993; Wing, 1976). Or the child may be engaging in very antisocial behavior (spitting, faecal smearing, etc.). Quite reasonably, parents, teachers, peers, and others should not have to put up with such a tyrannical, strong will on the part of their child, or with antisocial behavior, since they as parents, teachers, or peers also have needs.

A child's inflexibility or antisocial behavior should clearly not be given free reign if it is interfering with other people's liberty unreasonably, or interfering with safety, hygiene, and so forth. Help with parenting may be needed, to facilitate the child accommodating to others, and vice versa. But this is still not a clear justification for calling AS/HFA a disability—it is no more justified than a woman saying her husband is disabled simply because his hobby is dominating her life unreasonably, or saying that your neighbor is disabled simply because his behavior interferes with your privacy. Individuals clearly need to accommodate to each other, since there may be a clash of interests or styles, but is one disabled? Not necessarily.

AS/HFA is a disability because of its associated medical conditions

Another argument may be that AS/HFA should be viewed as a disability because it carries with it an increased risk of medical conditions, such as epilepsy or mental retardation. For example, in classic autism, epilepsy occurs in one third of cases and mental retardation (IQ below the average range) occurs in about three quarters of cases (Rutter, 1978). However, such associated medical conditions are clearly not specific to AS/HFA, and it is AS/HFA-specific features that are under discussion.[6] Epilepsy or mental retardation may be justifiably seen as disabilities. These will require separate examination. But is AS/HFA (which by definition involves no retardation) necessarily a disability?

One might argue that some associated conditions are clearly disabilities. An example is language impairment. Many young children with HFA have little language. In some cases this applies to both their expression and comprehension. The combination of an autistic lack of social interest, together with little or no language, can be seen as a major disadvantage in a world of other people. Even if we downplay the importance of sociability, the child can still be regarded as disabled in being delayed in developing the ability to make his or her needs known. But while the notion of a disability may reasonably apply to extreme cases, the earlier point remains valid: that individuals with HFA need not necessarily be viewed as disabled, as most of them will develop enough language even after a delay.

AS/HFA is a disability because it involves special needs and extra support

Perhaps the most compelling reason for viewing AS/HFA as a disability is that such individuals clearly have special needs (they need to be recognized as different, may require different kinds of teaching methods or schooling, or specific kinds of treatment) and access to such support in the present legal framework

6. The rate of epilepsy in cases of AS/HFA may be much lower. This remains to be determined.

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only flows to the child and their family if the case can be made that autism is a disability. Special funding does not automatically flow simply because one regards the child as "different." Given this economic reality, one should not remove the term "disability" from the description of AS/HFA without ensuring that extra provision would still be available even if the term "difference" was more appropriate. This is really an issue relating to social policy, health and education economics, and the legal system.

Characterizing the Underlying Difference in AS/HFA

We turn next to consider two different models that attempt to characterize the dimension(s) along which AS/HFA differs from normality.

The folk psychology–folk physics model

The first model suggests that the two relevant dimensions along which to characterize individuals with AS/HFA might be "folk psychology" and "folk physics." Folk psychology involves understanding how people work. Folk physics involves understanding how inanimate things work. The model assumes that all individuals on the autistic continuum show degrees of folk psychology impairment, while their folk physics may be intact or even superior, relative to their mental age (Baron–Cohen, 2000; Baron–Cohen & Hammer, 1997a).

Folk psychology. There is plenty of evidence that people with autism spectrum conditions have degrees of difficulty in mind reading, or folk psychology. There have been more than 30 experimental tests, the vast majority revealing profound impairments in the development of their folk psychological understanding. These are reviewed elsewhere (Baron–Cohen, 1995, 2000) but include deficits in joint attention (Baron–Cohen, 1989c; Sigman, Mundy, Ungerer, & Sherman, 1986), use of mental state terms in language (Baron–Cohen, Leslie, & Frith, 1986; Tager–Flusberg, 1993), production and comprehension of pretence (Baron–Cohen, 1987; Wing & Gould, 1979), understanding that "seeing-leads-to-knowing" (Baron–Cohen & Goodhart, 1994; Leslie & Frith, 1988), distinguishing mental from physical entities (Baron–Cohen, 1989a; Ozonoff, Pennington, & Rogers, 1990), making the appearance-reality distinction (Baron–Cohen, 1989a), understanding false belief (Baron–Cohen et al., 1985; Perner, Frith, Leslie, & Leekam, 1989), understanding beliefs about beliefs (Baron–Cohen, 1989b), and understanding complex emotions (Baron–Cohen, 1991). Some adults with AS/HFA only show their deficits on age-appropriate adult tests of folk psychology (Baron–Cohen, Jolliffe et al., 1997; Baron–Cohen, Wheelwright, & Jolliffe, 1997; Happe, 1994). This deficit in their folk psychology is thought to underlie the difficulties such children have in social and communicative development (Baron–Cohen, 1988; Tager–Flusberg, 1993), and the development of imagination (Baron–Cohen, 1987; Leslie, 1987).

Folk physics. Other evidence suggests that children with AS/HFA may not only be intact but also superior in their folk physics. First, clinical and parental descriptions of children with AS/HFA frequently refer to their fascination with machines (the paragon of nonintentional systems; Hart, 1989; Lovell, 1978; Park, 1967). Indeed, it is hard to find a clinical account of autism spectrum conditions that does *not* involve the child being obsessed by some machine or another. Examples include extreme fascinations with electricity pylons, burglar alarms, vacuum cleaners, washing machines, video players, calculators, computers, trains, planes, and clocks. Sometimes the machine that is the object of the child's obsession is quite simple (e.g., the workings of drainpipes or the design of windows). A systematic survey of obsessions in such children has confirmed such clinical descriptions (Baron–Cohen & Wheelright, 1999).

Of course, a fascination with machines need not necessarily imply that the child *understands* the machine, but in fact most of these anecdotes also reveal that children with autism have a precocious understanding, too. The children (with enough language, such as

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is seen in children with AS/HFA) may be described as holding forth, like "little professors," on their favorite subjects or areas of expertise, often failing to detect that their listeners may have long since become bored of hearing more on the subject. The children's apparently precocious mechanical understanding, evident while they are being relatively oblivious to their listeners' level of interest, suggests that their folk physics might be outstripping their folk psychology in development. The anecdotal evidence includes not just an obsession with machines but with other kinds of physical systems. Examples include obsessions with the weather (meteorology), the formation of mountains (geography), motion of the planets (astronomy), and the classification of lizards (taxonomy).

Leaving clinical and anecdotal evidence to one side, experimental studies converge on the same conclusion, that children with AS/HFA not only have an intact folk physics but they have accelerated or superior development in this domain (relative to their folk psychology and relative to their mental age, both verbal and nonverbal). First, using a picture-sequencing paradigm, we found that children with autism[7] performed significantly better than mental-age matched controls in sequencing physical–causal stories (Baron–Cohen et al., 1986). The children with autism also produced more physical–causal justifications in their verbal accounts of the picture sequences they made, compared to intentional accounts. This study, however, did not involve a chronological age (CA) matched control group, so the apparent superiority in folk physics in autism may simply have reflected their higher CA.

Second, two studies have found that children with autism showed good understanding of a camera (Leekam & Perner, 1991; Leslie & Thaiss, 1992). In these studies, children with autism could accurately infer what would be depicted in a photograph, even though the photograph was at odds with the current visual scene. This contrasted with their poor performance on False Belief tests. The pattern of results by the children with autism on these two tests was interpreted as showing that while their understanding of mental representations was impaired, their understanding of physical representations was not. This pattern has been found in other domains (Charman & Baron–Cohen, 1992, 1995). But the False Photo Test is also evidence of their folk physics outstripping their folk psychology and being superior to mental age (MA) matched controls.

Family studies add to this picture. Parents of children with AS also show mild but significant deficits on an adult folk psychology task, mirroring the deficit in folk psychology seen in patients with AS/HFA (Baron–Cohen & Hammer, 1997b). This is assumed to reflect genetic factors, since AS/HFA appear to have a strong heritable component (Bailey et al., 1995; Bolton et al., 1994; Folstein & Rutter, 1977; Le Couteur et al., 1996). On the basis of this model, one should also expect that parents of children with autism or AS to be overrepresented in occupations in which possession of superior folk physics is an advantage, while a deficit in folk psychology would not necessarily be a disadvantage. The paradigm occupation for such a cognitive profile is engineering.

A recent study of 1000 families found that fathers and grandfathers (patri- and matrilineal) of children with autism or AS were more than twice as likely to work in the field of engineering, compared to control groups (Baron–Cohen, Wheelwright, et al., 1997). Indeed, 28.4% of children with autism or AS had at least one relative (father or grandfather) who was an engineer. Related evidence comes from a survey of students at Cambridge University, studying either sciences (physics, engineering, or math) or humanities (English or French literature). When asked about family history of a range of psychiatric conditions (schizophrenia, anorexia, autism, Down syndrome, language delay, or manic depression), the students in the science group showed a 6-fold increase in the rate of autism in their families, and this was specific to autism (Baron–Cohen et al., 1998).

Finally, children with AS have been found to perform at a superior level on a test of folk

7. Such studies have not yet been conducted with AS/HFA but the findings from autism are relevant.

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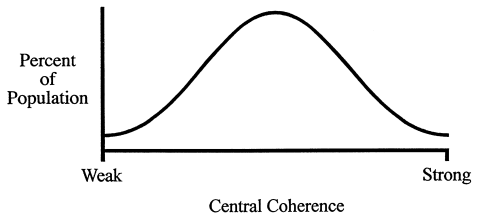


Figure 1. This second model suggests individuals show strong to weak central coherence. Individuals with AS/HFA may be at the extreme left of this distribution (Frith, 1989).

physics (Baron–Cohen, Wheelwright, Scahill, & Spong, 2000), and some adults with AS have reached the highest levels in physics and mathematics, despite their deficits in folk psychology (Baron–Cohen, Wheelwright, Stone, & Rutherford, 1999).

The central coherence model

The folk psychology–folk physics model is not the only attempt to capture the relevant dimensions underlying the autistic spectrum. A second model suggests the relevant dimension may be from weak to strong central coherence. Weak central coherence involves greater attention to local details relative to more global information (see Figure 1; Happe & Frith, 1996). Central coherence is a slippery notion to define. The essence of it is the normal drive to integrate information into context, gist, gestalt, and meaning. Frith argues that the autistic person's superior ability on the Embedded Figures Test (Jolliffe & Baron–Cohen, 1997; Shah & Frith, 1983) and on an unsegmented version of the Block Design subtest in the Wechsler Intelligence Scale for Children (WISC) and Wechsler Adult Intelligence Scale (WAIS; Shah & Frith, 1993) arises because of a relative immunity to context effects in autism (Frith, 1989). Happe also reports a failure, by people with autism, to use context in reading, such that homophones are mispronounced (e.g., "There was a *tear* in her eye" might be misread so as sound like "There was a *tear* in her dress"; Happe, 1997). A recent study has shown that children with autism are equally good at judging the identity of familiar faces in photographs, whether they are given the whole face or just part of the face. Nonautistic controls show a "global advantage" on such a test, performing significantly better when given the whole face, not just the parts of the face (Campbell et al., 1999). The central coherence account of autism is attractive in having the potential to explain the nonholistic, piecemeal, perceptual style characteristic of autism, and the unusual cognitive profile seen in this condition (including the islets of ability). Recently, work in visual search has shown that individuals with autism spectrum conditions may be superior in their ability to make fine discriminations of targets from distractors (O'Riordan, 1999; Plaisted, O'Riordan, & Baron–Cohen, 1998a, 1998b). Such work may help take forward the concept of weak central coherence.

Note that these two models (folk psychology–folk physics and central coherence) are not necessarily incompatible, since it is possible to imagine how weak central coherence could cause superior folk physics, as well as difficulties in folk psychology. Jarrold, Jimenez, and Butler report that in normal individuals, folk psychology and central coherence are indeed inversely correlated (1998).

Whatever the relevant model, the dimensional approach is useful in reminding us that AS/HFA may simply be part of quantitative variation and individual differences in cognitive profiles, or styles of information processing. This approach could be recast to avoid the implication that one style is better (stronger) or worse (weaker), or that one is intact and another deficient. For example, the terms "weak" and "strong" central coherence are sometimes replaced by the more neutral terms "local" versus "global" processing (referring to whether one spends more time processing at one level than another; see Figure 2).

The advantage of both of these models is that individuals with AS/HFA are understood in terms of an underlying dimension, and that this dimension blends seamlessly with normality, so that we are all situated somewhere on the same continuum. Most importantly, to reiterate, one's position on the continuum is

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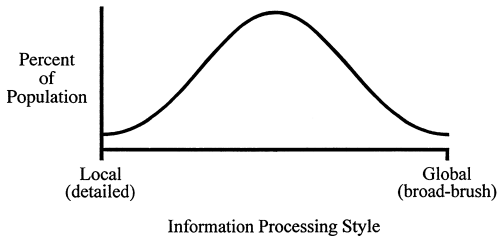


Figure 2. This model redescribes the central coherence model in less value-laden terminology. Individuals are seen as showing local to global information processing styles. Again, individuals with AS/HFA may be at the extreme left of this distribution, spending relatively more time processing detail rather than processing in a broad-brush approach (Happe, 1996).

said to reflect a different cognitive style (Frith, 1989). Dimensional models also do not require a line to be drawn between ability and disability. Finally, they avoid the notion that individuals with AS/HFA are in some sense qualitatively different from those without AS/HFA. Such a notion is increasingly hard to defend in the light of intermediate cases. These are easier to accommodate in terms of quantitative variation.

Implications for Understanding the Apparent Increase in Prevalence of AS/HFA

There are some reports that AS/HFA is increasing in prevalence (Gillberg & Wing, 1999). It is unclear if this simply reflects better detection or if there is a genuine increase. However, if there is a genuine increase, this presents something of a paradox for the disability view: disabilities with a genetic basis which affect social skill and thus potentially reduce mating opportunities should be subject to *negative* selective pressures. Such disabilities should therefore be expected to *reduce* in prevalence with time. In order to be on the increase, such genes would have to be being *positively* selected. Increased prevalence presents no difficulties for the difference view, however, since a cognitive style can at different times or under different conditions confer *advantages* to the individual. For example, the computer revolution in the 20th century has created unprecedented opportunities for employment and economic prosperity for individuals with superior folk physics. This may have had positive effects on the reproductive fitness of such individuals, leading to an increase in the genes for AS/HFA in the gene pool. Such a speculation is testable: for example, one would predict higher rates of AS/HFA in the children of couples living in environments which function as a niche for individuals with superior folk physics abilities (e.g., "Silicon Valley," MIT, Cal Tech) compared to environments where no such niche exists. Our recent survey of scientists in Cambridge University showing increased familiality of autism spectrum conditions is a first such clue that such effects may be operating (Baron–Cohen et al., 1998).

Summary

In a world where individuals are all expected to be social, people with AS/HFA are seen as disabled. The implication is that if environmental expectations change, or in a different environment, they may not necessarily be seen as disabled. As we have known in relation to other conditions, concepts of disability and handicap are relative to particular environments, both cultural and biological (Clark, 1999; Richters & Cicchetti, 1993; Spitzer, 1999; Wakefield, 1997). It may be time to extend this way of thinking to the field of AS/HFA. We could imagine, for example, people with AS/HFA might not necessarily be disabled in an environment in which they can exert greater control of events. The social world is very hard to control, while the technological world of machines is in principle highly controllable. Equally, people with AS/HFA might not necessarily be disabled in an environment in which an exact mind, attracted to detecting small details, is an advantage. In the social world there is no great benefit to such a precise eye for detail, but in the world of math, computing, cataloging, music, linguistics, craft, engineering, or science, such an eye for detail can lead to success rather than disability. In the world of business, for example, a mathematical bent for estimating risk and profit, together with a relative lack of

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awareness of the emotional states of one's employees or rivals, can mean unbounded opportunities.

It is hoped that this article, at the dawn of the new millennium, will open the debate toward identifying whether there are any arguments for necessarily viewing AS/HFA as disabilities. In this article, none are found to apply persuasively to AS/HFA, even if they may apply to the "lower-functioning" cases. In contrast, the arguments in favor of viewing AS/HFA as a "difference" are more compatible with the "continuum" notion, and may be morally more defensible. The sole reason for retaining the term "disability" in relation to AS/HFA may be to ensure access to provision; it may be the legal system that needs revision, so that a child whose autistic "difference" leads him or her to have special needs, will still receive special support.

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