A Novel Way to Measure Theory of Mind: Endorsing Beliefs About Individual Differences in Agreement With Empirical Findings Predicts Self Reported Cognitive Empathy, Autism, and Schizotypy, and Separates Cognitive Empathy from Social Skill & Motivation

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Conway et al. (2020) reported that performance on a task reflecting how well individuals understand how different people would act and think based on their personality indicates theory of mind and intelligence. If this is the case, then assuming they are accurate, generalized beliefs about individual differences reflecting statistical findings should be associated with theory of mind as well. People who are interested in psychology tend to have higher levels of cognitive empathy (Svedholm-Häkkinen & Lindeman 2015), and it would be expected that people high in cognitive empathy would be better at generating accurate hypotheses about people's minds and would have a higher drive to create such hypotheses, just as those high in systemizing are better at understanding systems and have a higher drive to create them.

In Cloudfindings (2024b), I created a scale of statements about individual differences based on my understanding of empirical findings about them, coded so that higher scorers tend to have beliefs about people and minds in agreement with empirical psychology literature as a novel way to measure cognitive empathy. In this post I expand on the analysis of this scale.

As reported in Cloudfindings (2024b), the principal component structure did not produce a component corresponding to accurate beliefs about individual differences, but seemed to produce components mostly reflecting politically motivated beliefs about individual differences (e.g., the first component had almost exclusive loadings on sex difference related beliefs) [Table 1]. To attempt to extract such a factor, PCA was conducted on the items as well as the cognitive empathy measures in the study, and the rotated two and three factor solutions produced a factor corresponding to accurate beliefs about individual differences and cognitive empathy, however different items loaded on the cognitive empathy factor in the two and three factor solutions, though the majority loaded in the expected direction on both [Table 2]. Ultimately, I was not able to extract such a factor cleanly, however it was demonstrated to exist, and all items except for two correlated with cognitive empathy above r=0.10 in the expected direction on one or both of the factor solutions.

Table 1

	PC1	PC2	PC3
{reverse} Intelligent people typically go to bed earlier	-0.30	-0.13	0.18
{reverse} People who are transgender tend to be more socially skilled	0.10	0.66	-0.01

{reverse} Women tend to be more impulsive and make poorer long term decisions	-0.76	-0.11	0.00
Women are often attracted to popularity in men	0.62	0.23	0.41
{reverse} People from rural areas outside of cities are more prone to schizophrenia	-0.30	0.01	0.74
{reverse} People who are highly into sports are typically introverted	-0.07	0.47	0.35
{reverse} The music genres people listen to do not predict their personality	0.19	0.57	0.17
{reverse} Women tend to be more promiscuous than men	-0.71	-0.06	0.13
{reverse} Smart people typically don't have a good fashion sense	-0.51	-0.23	0.13
{reverse} Women have higher standards for physical attractiveness than men	-0.66	-0.35	0.13
{reverse} Musicians are typically precise and orderly	-0.50	0.47	0.09
Most people have some symptoms of mental illness that affect their personality	0.26	0.06	-0.46
Women tend to be more attached to their caregivers	0.48	-0.14	0.51
{reverse} Magicians are more likely to have unusual beliefs and odd sensory experiences	-0.38	0.25	-0.10
Comedians tend to be impulsive and introverted	0.26	-0.44	0.23
Masculine women are more promiscuous	0.55	-0.20	0.51
{reverse} Gamers are typically more socially skilled	0.01	0.57	-0.04
{reverse} Open mindedness is typically highest in early childhood and old age	-0.21	0.46	0.05
{reverse} Poor handwriting is an indicator of low intelligence	-0.50	0.15	0.22
{reverse} Logic and empathy are typically opposing forces on thinking	-0.44	0.03	0.16

Table 2

	2-Factor	3-Factor
Social Information Processing	**0.72**	**0.76**
Social Skills	0.15	**0.27**
Social Awareness	**0.73**	**0.79**
Literal Language	**-0.77**	**-0.74**
{reverse} People from rural areas outside of cities are more prone to schizophrenia	**0.54**	**0.65**
{reverse} The music genres people listen to do not predict their personality	**0.50**	0.18
Women are often attracted to popularity in men	**0.36**	0.13
{reverse} People who are highly into sports are typically	**0.36**	0.15

introverted		
{reverse} Musicians are typically precise and orderly	**0.32**	0.22
Masculine women are more promiscuous	**0.30**	**0.31**
{reverse} Gamers are typically more socially skilled	**0.30**	0.01
{reverse} People who are transgender tend to be more socially skilled	**0.29**	-0.06
Women tend to be more attached to their caregivers	0.24	0.22
{reverse} Open mindedness is typically highest in early childhood and old age	0.17	-0.01
{reverse} Women have higher standards for physical attractiveness than men	0.03	**0.36**
{reverse} Women tend to be more promiscuous than men	0.12	**0.31**
{reverse} Smart people typically don't have a good fashion sense	0.02	**0.28**
Comedians tend to be impulsive and introverted	0.09	**0.27**
{reverse} Women tend to be more impulsive and make poorer long term decisions	0.03	**0.25**
{reverse} Intelligent people typically go to bed earlier	0.08	0.22
{reverse} Logic and empathy are typically opposing forces on thinking	0.12	0.21
{reverse} Poor handwriting is an indicator of low intelligence	0.14	0.16
{reverse} Magicians are more likely to have unusual beliefs and odd sensory experiences	0.05	0.01
Most people have some symptoms of mental illness that affect their personality	**-0.34**	**-0.46**

Bold = statistically significant

Among the scale items, only one item associated in the opposite direction that it was expected to - "Most people have some symptoms of mental illness that affect their personality" predicted low cognitive empathy. I suggest that the reason for this is because people with higher cognitive empathy likely perceive pathologized traits as part of normal human variation, and thus would be less likely to perceive traits such as positive schizotypy as being "symptoms of mental illness".

Principal components analysis of the total score for the scale with the other cognitive empathy scales revealed that the scale loaded highly on cognitive empathy [Table 3].

Table 3

	PC1
Social Information Processing	0.83
Social Skills	0.35
Social Awareness	0.86

Literal language	-0.79
Intuitive psychology understanding	0.67

To look at the correlates of the intuitive psychology scale compared to self reported cognitive empathy, a cognitive empathy factor was extracted from the other cognitive empathy scales [Table 4], and the correlates of the intuitive psychology scale and the cognitive empathy factor with other variables in the dataset were compared [Table 5].

Table 4

	PC1
Social Information Processing	0.83
Social Skills	0.45
Social Awareness	0.87
Literal language	-0.81

Table 5

	r with intuitive psych	r with CE factor
Social difficulty	**-0.29**	**-0.78**
Schizotypy (vs autism)	**0.33**	0.10
OcPD	**-0.35**	**-0.35**
Humanism	**0.26**	**0.43**
General disgust	**-0.40**	**-0.30**
Traditionalism	**-0.32**	-0.21
Sexual disgust	**-0.45**	**-0.27**
Rational-open	**0.31**	0.24
Selective empathy	**-0.30**	**-0.26**
Traditional spirituality	**-0.26**	-0.04
Ingroup morality	**-0.31**	-0.04
Purity morality	**-0.28**	-0.18
Rational-objective	0.19	**0.28**

Intelligence	0.10	**0.30**
Xenophobia	-0.10	**-0.27**
Secondary psychopathy	0.02	**-0.27**
OCD	-0.13	**-0.35**
Neuroticism	0.00	**-0.32**
Openness	0.10	**0.29**

The intuitive psychology scale and the cognitive empathy factor overlapped substantially in their correlates, supporting the scales validity as a measure of cognitive empathy. The intuitive psychology scale appeared to more accurately measure cognitive empathy as a cognitive ability rather than a motivation to understand others or being skilled at social interaction - it lacked correlation with openness and neuroticism, and had a weaker correlation with humanism which could be considered motivational influences on cognitive empathy. The intuitive psychology scale also correlated with the autism-schizotypy continuum, whereas self reported cognitive empathy did not, the autism-schizotypy continuum being a dimension of cognitive variation related to cognitive empathy (Andersen 2022), and the social difficulty factor that autism and schizotypy load positively on reflects general social difficulties caused by autism or schizotypy, which correlated with the intuitive psychology scale much less so than it did with the cognitive empathy factor, supporting the intuitive psychology scale as measuring innate cognitive empathy rather than things like social motivation and being skilled at social interaction. The intuitive psychology scale predicted lower levels of ingroup and purity morality, which have been hypothesized to be associated with lower cognitive empathy (Cloudfindings 2023), though group related biases have also been hypothesized to associate with *high* cognitive empathy (Crespi & Summers 2014) - it's possible both hypotheses could be true but group biases may reflect motivational aspects of cognitive empathy, whereas the cognitive aspects negatively influence such biases - supporting this is the lack of correlation with self reported cognitive empathy and these moral dimensions. Both sexual and general disgust sensitivity had a strong negative relationship with the intuitive psychology scale more so than the cognitive empathy factor, possibly reflecting an impairing effect of disgust on cognitive empathy which I hypothesized to occur in Cloudfindings (2024a).

To examine the hypothesis that social motivation and skills have differing correlates from cognitive empathy, and that the difference in correlations with the intuitive psychology scale and self reported cognitive empathy may reflect this, I first used principal components analysis to determine if a latent factor where social motivation/skills and cognitive empathy ability are opposed exists, which it did [Table 6] and the scores on this factor were then used to test if it would explain the difference between correlates of intuitive psychology scale and self reported cognitive empathy. I also investigated the varimax rotated two factor structure, and the intuitive psychology scale had almost equivalent loadings to the self reported cognitive empathy factors on one factor, with social skills loading entirely on the other factor.

Table 6

	PC1	PC2
Social Information Processing	**0.83**	-0.05
Social Skills	**0.35**	**0.89**
Social Awareness	**0.86**	0.13
Literal language	**-0.79**	0.09
Intuitive psychology understanding	**0.67**	**-0.46**

Table 7

	F1	F2
Social Information Processing	**0.81**	0.17
Social Skills	0.09	**0.95**
Social Awareness	**0.79**	**0.37**
Literal language	**-0.79**	-0.13
Intuitive psychology understanding	**0.77**	**-0.26**

The second principal component did not appear to explain the differences in the correlations. However, it did correlate with other measures in an intriguing way [Table 8].

Table 8

	Social skills (vs Cognitive empathy)
Political correctness	0.30
Intelligence	0.33
Schizotypy (vs autism)	-0.43
Secondary psychopathy	-0.44
Extraversion	0.41
Conscientiousness	0.47
Neuroticism	-0.45
Openness	0.34

The correlates of this factor support the hypothesis that social skills may have differing and opposing correlates from cognitive empathy, as previously discussed briefly in Cloudfindings (2024c). Conformity and cognitive empathy, are demonstrated here to be in fact opposed as I have discussed in previous papers (Cloudfindings 2024a,c)(Cloudfindings 2023). The social skill-cognitive empathy dimension correlated with the schizotypy-autism factor so that more schizotypal individuals were less socially skilled but better at understanding people, perhaps reflecting the opposition of culture-derived worldviews and independently formed high-level beliefs with autism and schizotypy (Andersen 2022). The correlation with intelligence and openness is unexpected - though it correlated more strongly with extraversion and conscientiousness. Interestingly, it appeared to correlate with the general factor of personality - high conscientiousness, openness, extraversion, emotional stability, except high agreeableness. I considered that this dimension could reflect conformity, and tested this using the non-conformity factor extracted in Cloudfindings (2024d). The factors correlated (r=-0.30), supporting that this factor may at least partly reflect conformity.

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