KNOWLEDGE OF NONVERBAL CUES, GENDER, AND NONVERBAL DECODING ACCURACY

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ABSTRACT: The Test of Nonverbal Cue Knowledge (TONCK), a paper and pencil test measuring explicit knowledge of nonverbal cue meanings and uses, was developed and found to be reliable and to have predictive ability. In four studies, participants were given the TONCK and one or more tests of accuracy in decoding nonverbal cues: the adult faces and voices tests of the Diagnostic Analysis of Nonverbal Accuracy 2 (DANVA) and the video and audio tests of the Profile of Nonverbal Sensitivity (PONS), as well as a test of general cognitive ability (the Wonderlic Personnel Test). Results are reported for the four studies individually and also in a meta-analytic summary. Females scored higher than males on the TONCK and on the PONS, and the TONCK predicted accuracy on the PONS and DANVA. Knowledge of nonverbal cues did not account for the gender difference in decoding ability on the PONS. Cognitive ability was related to the TONCK but did not compromise relations with other variables. The future utility of the TONCK, content specificity of tests, as well as the automaticity of judging cues are discussed.

KEY WORDS: decoding of nonverbal cues; gender differences; interpersonal sensitivity; knowledge of nonverbal cues.

Interpersonal sensitivity is the ability to sense and perceive accurately one's personal, interpersonal, and social environment (Knapp & Hall, 1997). Research has established that individuals are able to achieve accuracy above chance when judging states and traits from nonverbal cues (Hall & Bernieri, 2001; Knapp & Hall, 1997); however, the underlying mechanisms that allow individuals to achieve this accuracy are unclear. For example, there has been a consistent gender difference found in measures of interpersonal sensitivity (Hall, 1978, 1984; Hall, Carter, & Horgan, 2000), with women being more accurate than men in many studies using many different accuracy tasks involving the decoding of nonverbal cues. Based on traditional gender role stereotypes, researchers have

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The authors thank Crystal Mileti, Jenna Lavery, Erica Dempsey, and Jared Majerle for their assistance in conducting this research.

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assumed that women are more accurate on measures of nonverbal decoding because they have more knowledge of nonverbal cues (e.g., Briton & Hall, 1995; Brody & Hall, 1993; Jansz, 2000; Noller, 1986). Although this line of reasoning is plausible, it has remained untested.

The present research explores knowledge of nonverbal cues. Examining an individual's knowledge of nonverbal cues is an interesting topic in and of itself, regardless of whether it underpins women's advantage in decoding nonverbal cues. This topic has not received much attention in research. How do you measure an individual's level of nonverbal cue knowledge? Researchers have tried asking individuals what their level of knowledge is, but self-reports have proved unsuccessful in predicting nonverbal decoding accuracy (Riggio & Riggio, 2001). This suggests that people do not know how much they know about nonverbal cues. Knowledge can, however, be objectively measured with a paper and pencil test. Vrij and Semin (1996) administered a short paper and pencil test that measured knowledge of nonverbal cues that are associated with deception to several groups to compare their knowledge levels. There are, however, no general nonverbal cue knowledge tests. With this in mind we developed a paper and pencil test of nonverbal cue knowledge in order to explore this area of research. This test was used to investigate three hypotheses: first, that explicit knowledge is associated with accuracy in decoding nonverbal cues; second, that women would possess more explicit knowledge than men; and, third, that the gender difference in nonverbal decoding accuracy can be accounted for by knowledge of nonverbal cues. The present article investigates these hypotheses as well as presenting basic psychometric information and discriminant validity data on the Test of Nonverbal Cue Knowledge (TONCK). The general discussion also contains a meta-analytic summary of findings across the four studies that we report.

Study 1: Method

Test Development

Findings from the literature were used to create a pool of 128 true/false items. Textbooks on nonverbal communication, monographs, and edited volumes were used in this search (Burgoon, Buller, & Woodall, 1989; Ekman & Rosenberg, 1997; Hall, 1984; Knapp & Hall, 1997; Siegman & Feldstein, 1985). A table of random numbers was used to determine the page numbers that would be read for established findings. Any eligible findings on the pages identified were turned into true/false questions. All candidate items were discussed between the authors and those items that seemed too obscure or trivial or not well established in empirical research were discarded, leaving 128 items whose empirical support (in the authors' opinion) was most solidly grounded in empirical research. Item content was diverse and covered meanings of nonverbal cues, correlates of nonverbal cue usage, and knowledge of stereotypes about nonverbal cues or appearance. The test was designed to represent the broad concept of nonverbal communication. Items were presented in two different random orders to control for fatigue effects. Scoring was done by summing correct answers so that higher values indicate more knowledge of nonverbal cues.

An initial analysis revealed a Cronbach's alpha of .76 for the original 128 items given to participants in Study 1 described below. To improve reliability and reduce the length of the test we performed an item analysis. Items that were correlated at or above .15 with the total were retained (81 items, Cronbach's alpha=.89). This 81-item version of the test was used in all further analyses of Study 1. Principal components analysis produced no interpretable factor structures.

Participants

One hundred fifty-one (63 male, 88 female) students from Northeastern University participated in partial fulfillment of introductory psychology class requirements. Although no other sociodemographic data were collected, participants in this subject pool are typically 19 years old, 87% Caucasian, 5% Asian, 4% African American, 3% Hispanic, and 1% other.

Materials

Test of Nonverbal Cue Knowledge (TONCK). The 81-item TONCK, as described above, was used in this study.

The Diagnostic Analysis of Nonverbal Accuracy 2-AF (DANVA 2-AF). This test measures the ability to accurately detect emotion in facial expressions and consists of 24 color slides of posed facial expressions (Nowicki & Duke, 1994, 2001). The emotion (happy, sad, angry, or fearful) shown in each face is judged by multiple choice. A slide projector and projection screen were used to administer the DANVA 2-AF.

Procedure

Participants were run in groups of 5–15 people. Each DANVA 2-AF slide was shown for 3–4 s with 2 or 3 s in between each slide. The TONCK was then given, with participants working at their own pace.

Results and Discussion

Mean accuracy on the TONCK was 74% (59.70 out of 81, range = 19–76, SD = 10.20). A *t*-test against chance level (40.5, corresponding to the number of items one should get correct by guessing alone) was conducted, $t(150) = 23.17$, $p < .001$. Thus, overall accuracy was significantly above the chance level.

Point-biserial correlations were conducted to determine if there was a gender difference on the TONCK. Gender (males = 0, females = 1) was correlated with the TONCK, $r(149) = .18$, $p < .05$, with females ($M = 61.30$, SD = 9.42) scoring higher than males ($M = 57.54$, SD = 10.90).

There was a mean score of 18.88 (SD = 3.35) on the DANVA 2-AF (79% accuracy). A point-biserial correlation revealed that there was not a gender difference on the DANVA 2-AF, $r(142) = .08$, $p = .36$ ($M = 18.59$, SD = 3.05 for males and $M = 19.11$, SD = 3.56 for females).

The TONCK was not correlated with the DANVA 2-AF, $r(142) = .06$, $p = .50$. This correlation was also negligible for males and females separately ($r(59) = -.01$, $p = .90$ for males and $r(81) = .08$, $p = .43$ for females).[1]

To summarize, accuracy on the TONCK was above chance and in the optimal range for detecting individual differences (74% where 50% is chance level). In support of the construct validity of the TONCK, female participants scored significantly higher than male participants. This effect is similar in magnitude to the gender difference that is often found on tasks of judging the meanings of nonverbal cues (Hall, 1978, 1984). In this study, the correlation between the TONCK and the DANVA adult faces test, a widely used and well-validated instrument (Nowicki & Duke, 1994, 2001), was negligible. Perhaps this small correlation could have been expected because the TONCK's content is broad and diverse while the DANVA 2-AF covers a very specific content area. Another possible explanation is that the labeling of pure emotions, as required on the DANVA 2-AF, may be a fairly automatic process to which one's explicit knowledge contributes little.

In Study 2 we administered the DANVA again (the adult voices test as well as the adult faces test), and we also administered a more omnibus test of decoding nonverbal cues, the Profile of Nonverbal Sensitivity (PONS; Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979). Study 2 was also designed to assess retest reliability.

Study 2: Method

Participants

Thirty-seven (14 male, 23 female) students from Northeastern University participated in partial fulfillment of class requirements. The sociodemographic characteristics of the sample were discussed in Study 1.

Materials

The Test of Nonverbal Cue Knowledge (TONCK) (81-item version). The 81 items identified in Study 1 were again used in this study; however, the polarity of some of the items was changed by rewording so that the true/false correct answers would be balanced. This final version of the TONCK is shown in the appendix.

The Profile of Nonverbal Sensitivity (PONS). The PONS (Rosenthal et al., 1979) measures nonverbal decoding accuracy, specifically the ability to identify a situation-specific state in a female encoder (Hall, 2001). Two short versions of this test were used. The PONS audio test consists of 40 items that are 2 s long and contain content-masked speech. This content masking was accomplished by electronic filtering and random splicing so that words could not be understood. Participants heard an audio item and then determined which of two alternative situations it corresponded to (for example ''admiring nature'' or ''asking forgiveness''). Altogether there are 20 such situations portrayed in the test. The PONS video contains 40 items that consist of black and white silent video segments that are 2 s long and contain face or body and hand movements. Participants watched a video item and determined which of two alternatives it pertained to (for example ''talking about the death of a friend'' or ''expressing jealous anger''). Both of these short forms are extracted from the full PONS test (Rosenthal et al., 1979).

The PONS test is a broader test of nonverbal cues than the DANVA 2-AF in that it covers a wider range of cue meanings. The nature of the test (audio and video clips) also makes it different from the DANVA 2-AF (still photos). Finally, because the items on the PONS require the test-taker to consider various ways one might act in 20 different situations, it is more likely to require more deliberate processing than does the DANVA 2-AF.

The Diagnostic Analysis of Nonverbal Accuracy 2-Adult Faces and Adult Paralanguage (DANVA 2-AF and DANVA 2-AP, respectively). The DANVA 2-AF described in Study 1 was used. The DANVA 2-AP measures the ability to accurately detect emotion in audio clips of standard-content speech and consists of 24 items (Baum & Nowicki, 1998; Nowicki & Duke, 1994). The emotion (happy, sad, angry, and fearful) expressed in each audio clip is judged by multiple choice. An audio cassette player was used to administer the DANVA 2-AP.

Procedure

Participants were run in two sessions 2 weeks apart. In the first session, the TONCK and PONS audio and video tests were given, and in the second session, the TONCK and DANVA adult faces and adult paralanguage tests were given.

Results and Discussion

Mean accuracy on the TONCK was 74% (60.11 out of 81, range = 41–77, SD = 8.58) which is identical to the accuracy mean in Study 1. A *t*-test against chance level was conducted, which again revealed that the mean level of knowledge was significantly higher than chance, $t(36) = 13.90$, $p < .001$. Cronbach's alpha (internal consistency) was .82, and the correlation between scores across the two testings was $r(33) = .88$, $p < .001$. A paired *t*-test comparing performance on the two occasions was $t\,(34) = -3.29$, $p < .05$, and showed that performance improved from the first to the second testing ($M = 60.50$ and 62.66, respectively). There was not a significant gender difference in this sample, $r(35) = .10$, $p < .55$.

There was a mean score of 20.14 (SD = 1.90) on the DANVA 2-AF and a mean score of 18.00 (SD = 1.84) on the DANVA 2-AP. There was no gender difference for the DANVA 2-AF, $r(33) = -.07$, $p < .70$ ($M =$ 20.31, SD = 2.06 for males and $M = 20.05$, SD = 1.84 for females) or for the DANVA 2-AP, $r(33) = -.03$, $p < .85$ ($M = 18.08$, SD = 1.93 for males and $M = 21.00$, SD = 1.84 for females).

Correlations between the TONCK and the nonverbal decoding tests were as follows: DANVA 2-AF, $r(33) = .34$, $p < .05$; DANVA 2-AP, $r(33) = .25$, $p < .16$; PONS video, $r(35) = .06$, $p < .71$; and PONS audio, $r(35) = .16$, $p < .36$.

To summarize, Study 2 further established the psychometric adequacy of the TONCK in terms of both internal consistency and retest reliability, and showed a mixed picture with regard to the correlations with gender and nonverbal decoding skill. In Study 3, we again administered the DANVA adult faces and voices tests, and we administered an IQ test in order to address discriminant validity. Attempts to create paper and pencil tests of nonverbal cues were abandoned in the past because correlations with general cognitive ability were unacceptably high (Walker & Foley, 1973).

Study 3: Method

Participants

Twenty-five students (12 males, 13 females) from Northeastern University participated for partial course credit. Sociodemographic characteristics were discussed in Study 1.

Materials

The Test of Nonverbal Cue Knowledge (TONCK) (81-item version). The final version of the TONCK described in Study 2 was used.

The Diagnostic Analysis of Nonverbal Accuracy 2-Adult Faces and Adult Paralanguage (DANVA 2-AF and DANVA 2-AP, respectively). These tests were described in Studies 1 and 2.

Wonderlic Personnel Test (WPT). The WPT (Wonderlic, 1983) is a 12-min, 50-item test of cognitive ability. This test is used as a general test of intelligence because its items are based on the original Otis Test of Mental Ability and because scores on the WPT correlate well with other measures of IQ (McKelvie, 1989).

Procedure

Participants were run in small groups in a classroom setting, as in the previous studies.

Results and Discussion

In this smaller sample, reliability was not calculated. Mean accuracy on the TONCK was 69% (55.56 out of 81, range = 33–70, SD = 9.57). In this sample there was a significant gender difference, $r(23) = .49$, $p < .05$, with females ($M = 60.00$, SD = 7.16) scoring higher than males ($M = 52.08$, SD = 10.51). This replicated the gender difference found in Study 1.

The correlation of the TONCK with the DANVA 2-AF was $r(23) = .36$, $p < .08$, and the correlation with the DANVA 2-AP was $r(23) = .10$, $p < .65$. Females were marginally significantly better than males on the DANVA 2-AF, $r(23) = .36$, $p < .08$ ($M = 20.08$, SD = 2.06 for females, $M = 17.92$, SD = 3.70 for males) and on the DANVA 2-AP, $r(24) = .37$, $p < .07$) ($M = 19.62$, SD = 2.18 for females, $M = 18.15$, SD = 1.99 for males). Finally, the correlation of the TONCK with the Wonderlic IQ test was negligible, $r(24) = .07$, $p < .74$.

To summarize, gender was a significant correlate of the TONCK, and one of the nonverbal decoding tasks showed a marginally significant correlation with the TONCK. Discriminant validity was supported by the small correlation for IQ. However, Study 3 was hampered by its small sample size and all of the results required replication. In Study 4, a much larger sample was recruited and again we administered the Wonderlic IQ test as well as the PONS video and audio tests as in Study 2.

Study 4: Method

Participants

Two hundred and twenty-nine students (78 males, 151 females) from Northeastern University participated in partial fulfillment of class requirements. The sociodemographic characteristics of the sample population were discussed in Study 1.

Materials

The Test of Nonverbal Cue Knowledge (TONCK) (81-item version). The 81-item version used in Studies 2 and 3 was used.

The Profile of Nonverbal Sensitivity (PONS). The same PONS video and audio tests used in Study 2 were used.

Wonderlic Personnel Test (WPT). The WPT was used as in Study 3.

Procedure

Participants were run in small groups in a classroom setting. Order of administration of the tasks was counterbalanced.[2] The WPT was administered to only 86 participants.

Results and Discussion

The TONCK had acceptable reliability with a Cronbach's alpha of .72. The mean accuracy score on the TONCK was 73% (59.3 out of 81, range = 32–74, SD = 6.95). A *t*-test against chance level was conducted, which again revealed that the mean level of knowledge was significantly higher than chance, $t(213) = 39.53$, $p < .001$.

The TONCK was significantly correlated with gender, $r(212) = .15$, $p < .05$, with females ($M = 60.10$, SD = 6.40) scoring higher than males ($M = 57.80$, SD = 7.80). The TONCK was correlated with both the video PONS, $r(212) = .13$, $p < .05$, and the audio PONS, $r(212) = .28$, $p < .01$, such that more knowledge was associated with greater nonverbal decoding accuracy. Gender was related to both the video PONS, $r(227) = .13$, $p = .06$, and the audio PONS, $r(227) = .28$, $p < .001$. In both cases females had higher accuracy scores than males did.

Thus, knowledge predicted decoding accuracy, females had greater knowledge of nonverbal cues than males, and females had greater nonverbal decoding accuracy than males. To investigate the hypothesis that knowledge may account for the gender difference on the PONS, a multiple regression was done with TONCK and gender predicting decoding accuracy. Because the accuracy scores for the two nonverbal decoding tests (PONS audio and video) were correlated ($r = .34$, $p < .001$), they were summed to make one accuracy score. The overall regression was significant, $F(2, 211) = 12.27$, $p < .001$. When the effect of knowledge was controlled for, gender was still a significant predictor of PONS accuracy. Table 1 shows the relevant information for these relationships. This suggests that the gender difference in nonverbal decoding accuracy was not driven by knowledge as we operationalized it.

Intelligence was moderately correlated with our test of knowledge, $r(84) = .27$, $p < .05$; however, controlling for it did not weaken other relationships that were found with the TONCK.

TABLE 1

Regression of Nonverbal Decoding Accuracy on Gender and TONCK in Study 4

Variable	*β*	*t*	*p*	Zero-order correlation	Part correlation
Gender	.23	3.42	.001	.26	.22
TONCK	.20	3.01	.003	.23	.20

To summarize, further support was found for the reliability and construct validity of the TONCK. It was also established that although there was a relationship between the TONCK and overall intelligence as measured with a standard cognitive test, controlling for intelligence did not weaken the predictive ability of the TONCK. So, although intelligence had some relationship with our test of knowledge the relatively small correlation shows the TONCK is not simply another measure of intelligence, and relations of the TONCK with other variables did not depend on variance due to intelligence. Females scored higher on the TONCK and the PONS than males did, and the PONS was positively correlated with the TONCK. However, controlling for the TONCK did not have an impact on the gender difference in decoding accuracy.

Meta-Analytic Summary

A meta-analytic summary was conducted on the present studies to clarify the relationships between the TONCK and gender and nonverbal decoding accuracy. For this analysis, we calculated the weighted mean *r* (weighted by sample size) and the combined *p* (indicating how likely the set of results is to have occurred by chance) (Rosenthal, 1991). Table 2 displays the results of this analysis. It is evident from this analysis that explicit knowledge of nonverbal cues is higher among females. The average correlations between the TONCK and the four nonverbal decoding tests were generally similar. Though the average correlation for the DANVA 2-AP was only marginally significant, the mean effect for that test was very consistent with those obtained for the other nonverbal decoding tests.

TABLE 2

Meta-Analysis of Results Across Studies

Result	Studies	Weighted mean *r*	Range of *r*s	Combined *Z*	*p*-value
TONCK with gender	1–4	.18	.10–.49	3.73	.0001
TONCK with DANVA 2-AF	1–3	.14	.06–.36	2.61	.0045
TONCK with DANVA 2-AP	2 and 3	.19	.10–.25	1.40	.08
TONCK with PONS video	2 and 4	.14	.06–.13	1.61	.06
TONCK with PONS audio	2 and 4	.26	.16–.28	3.59	.0002

Note. See text for key to abbreviations. *p*-values are one-tail.

General Discussion

A new test, the TONCK, which measures explicit knowledge of nonverbal cues, was developed and evidence that this test is reliable and has predictive and discriminant validity was found. There has been little success in the past with paper and pencil tests relating to nonverbal communication, so this is potentially of benefit to researchers in this domain.

Accuracy was above chance and within the optimal range for detecting individual differences in all four studies. In support of construct validity, females scored significantly higher than males on knowledge of nonverbal cues in Studies 1, 3, and 4. This parallels the typical gender difference that is found on measures of nonverbal decoding accuracy in magnitude and direction. Knowledge of nonverbal cues was significantly related to at least one nonverbal decoding test in Studies 2 and 4, and marginally related in Study 3. Also in support of the TONCK's construct validity, intelligence was found not to affect the predictive ability of the TONCK.

A meta-analytic summary of these results confirmed the trends that were apparent across the individual studies, indicating that gender is a significant predictor of knowledge of nonverbal cues, with women scoring higher than men, and that knowledge of nonverbal cues is a significant predictor of nonverbal decoding accuracy.

Although females had more knowledge of nonverbal cues and greater nonverbal decoding accuracy, controlling for knowledge did not account for the gender difference in decoding accuracy in Study 4. Recently, another explanation for the gender difference in decoding accuracy was offered by Ickes, Gesn, and Graham (2000), who argued that differential motivation rather than differential knowledge may account for females' advantage over males on tests of interpersonal sensitivity. Ickes et al. (2000) suggested that females try harder to do well at things involving interpersonal skill because it is gender stereotypic to do so and this, not their knowledge, leads females to do better than males in this domain. Future research should further examine this and other proximal causes of the gender difference in nonverbal decoding accuracy.

Having demonstrated that explicit knowledge is significantly correlated with nonverbal decoding accuracy, what can we say about the future utility of the TONCK? Because the correlations were small in magnitude, it cannot be said that the TONCK is a substitute for audiovisual decoding tests. That is, explicit knowledge that is revealed on the TONCK is still only a modest indicator of how good a person will be when judging actual nonverbal cues. Nevertheless, it is impressive that both the PONS and the DANVA were significantly predicted by the TONCK, considering that there is essentially no item content overlap between the tests. To illustrate, though the PONS requires a person to indicate whether the expressor is "talking to a lost child," and the DANVA 2-AP requires a person to know what a fearful voice sounds like, there are no items on the TONCK that specifically test knowledge of this sort. Conversely, the TONCK includes knowledge (e.g., about gender differences in nonverbal behavior) that is not tested on the PONS or DANVA. Thus, the strength of association between the tests may be limited, even if both are drawing on the same overall domain of knowledge. On the other hand, to find a positive correlation even when there is a weak match in content between the tests suggests that there is such a thing as one's store of knowledge, in other words that having one piece of knowledge (on the TONCK, for example) predicts that one will have a different piece of knowledge (on the PONS, for example). This is, in fact, a more theoretically interesting possibility than finding that explicit knowledge predicts decoding performance only when there is a close match in content.

For some purposes, of course, it would be highly desirable to have a nonverbal knowledge test that has very specific content (as an example, knowing which nonverbal cues are and are not related to extraverted personality), and that is closely coordinated to the kind of skill to be tested on an audiovisual test (being able to judge extraversion from nonverbal cues). In other words, it may be useful to develop knowledge and decoding tests that are matched in content and specificity.

Other reasons for finding only a modest correlation between explicit knowledge and performance on an audiovisual test may relate to factors that come into play in the process of taking a performance test. Such factors might include the distracting nature of irrelevant cues, the physical appearance of the expressors, and motivational factors on the part of the test-taker. To the extent that motivation to attend to and process the audiovisual cues is left unmeasured, variation in motivation would add to random error in the decoding scores. To date, research is inconclusive on whether motivation plays a role in decoding nonverbal cues (Ambady, Bernieri, & Richeson, 2000; Bernieri, 1988; Klein & Hodges, 2001).

If, despite researchers' best efforts at psychometric refinement and item match, the correlation between a test of explicit nonverbal cue knowledge and audiovisual decoding tests remains modest, does that mean that a test of explicit knowledge has no utility? We think not. There may be many situations in which people apply their explicit knowledge in making behavioral choices. It will also be interesting to develop the network of associations between explicit knowledge and other variables, such as age, training, personality, cognitive and affective characteristics, and so forth. Obviously, too, the concept of ''explicit knowledge'' is not unitary; explicit knowledge may fall into as many distinct subdomains as tests of decoding nonverbal cues seem to (Hall, 2001). These tests of explicit knowledge can then lead to further knowledge of the interpersonal sensitivity construct.

Appendix: Test of Nonverbal Cue Knowledge (TONCK)

This is a test of your knowledge of nonverbal communication. Some of the items on this test are fairly easy and some are very difficult. Just do your best and answer every item even if you feel you might be guessing.

Question		True	False
1.	The arrangement of objects in the environment is unlikely to influence how people communicate.		×
2.	You maintain greater interaction distances with unknown adults than with familiar adults.	×	
3.	Liars hesitate less during their speech than people who are telling the truth do.		×
4.	People are likely to engage in self-touching when thinking (processing information).	×	
5.	Human beings can recognize the identity of a speaker with a high degree of accuracy.	×	
6.	People put larger interpersonal distances between themselves and short people than with tall people.		×
7.	You maintain greater interaction distances with overweight people than with thin people.	×	
8.	Romantic couples who experience more conflict and disagreement look at each other more frequently than other couples.		×
9.	Widening of the eyelids while speaking signifies emphasis on what was said.	×	
10.	When judging emotions from facial expressions, observers often confuse surprise and fear.	×	
11.	Someone who blinks a lot may be anxious.	×	
12.	The size of the pupil in a person's eye can influence interpersonal attraction to that person.	×	
13.	Rapid head nods are a signal to the speaker to finish quickly.	×	
14.	Embarrassment is associated with a distinctive set of facial behaviors.	×	
15.	The end of a sentence is usually followed by a pause in speech.	×	
16.	In a conversation speakers glance at their conversation partner at the end of a thought unit or idea.	×	

Appendix (*Continued*)

Question		True	False
17.	High foreheads are believed by lay people to be a sign of intelligence.	×	
18.	Shifts in the position of a person's body can signal the end but not the beginning of a conversation.		×
19.	Smiles are not reciprocated (returned) predictably.		×
20.	Observers can tell pretty well whether someone's facial expression reflects real or feigned (faked) enjoyment.	×	
21.	In a conversation speakers glance to signal the other person to speak.	×	
22.	Thin lips are believed by lay people to be a sign of conscientiousness.	×	
23.	People are more likely to touch themselves while telling the truth than when lying.		×
24.	Hand gestures can replace speech when we cannot or do not want to talk.	×	
25.	Someone's smile can affect your mood.	×	
26.	Blinking is not an indicator of physiological arousal.		×
27.	In a conversation speakers glance at their partner to obtain feedback.	×	
28.	How much your face tends to show your emotions when you are not trying to do so, has nothing to do with how accurate you will be at showing emotions when you make deliberate effort to do so.		×
29.	Thick lips on women are believed by lay people to be a sign of sexiness.	×	
30.	Hand gestures are not used to regulate the flow of an interaction.		×
31.	Men are more likely than women to pay attention to nonverbal cues that they can see, compared to nonverbal cues in the voice.		×
32.	Your seating position in a classroom is not related to your participation.		×

Appendix (*Continued*)

Question		True	False
33.	People from a lower socioeconomic background tend to score higher on judging the meanings of nonverbal cues than people from higher socio-economic background.		×
34.	Movements of the head and hands are infrequently used to accent the verbal message.		×
35.	How long you wait before speaking when it is your turn doesn't seem to distinguish people who are high and low in social anxiety.		×
36.	In a conversation speakers glance to see if the audience will let them continue.	×	
37.	To tell if someone is truly feeling amusement or enjoyment, you need to look at his or her eyes.	×	
38.	A speaker's age can be estimated fairly accurately from his or her voice.	×	
39.	In a dimly lit room people tend to sit farther apart.		×
40.	Social anxiety is related to higher levels of gazing at another person during conversation.		×
41.	Men are better at judging facial cues than women are.		×
42.	A speaker's sex cannot be guessed from his or her voice.		×
43.	Increased facial movements are associated with anxiety.	×	
44.	Under stress, the pitch of the human voice gets lower.		×
45.	Gaze can regulate the flow of communication.	×	
46.	Pitch is not used to differentiate male and female voices.		×
47.	Males are better at decoding nonverbal behavior than females.		×
48.	Errors while speaking, such as stutters, repetitions, and omissions, are more common for men than for women.	×	
49.	Gaze can express emotions.	×	
50.	Anger in the voice is revealed by a decrease in speech rate.		×

Appendix (*Continued*)

Question		True	False
51.	Parts of the face are used to open and close channels of communication.	×	
52.	Females react favorably to strangers approaching them from the side.		×
53.	Females gaze more at their partner when farther away from their partners than when they are closer.		×
54.	The pupil of your eye dilates when you are engaged in a task that requires mental effort.	×	
55.	Males react favorably to strangers approaching from the front.		×
56.	You gaze more when you are interested in the reactions of your audience.	×	
57.	Lowered brows are not a common sign of an angry feeling.		×
58.	When we want to speak we sometimes open our mouths in readiness to talk.	×	
59.	There is no difference in how much males and females gaze at a partner during an interaction.		×
60.	You gaze less when you like or love your partner.		×
61.	The eyebrow flash (raising and lowering of the eyebrow) is found in greeting rituals and signals desire to interact.	×	
62.	Interpersonal attraction is not a predictor of how close people stand to each other.		×
63.	You gaze less when you want to influence or dominate.		×
64.	Among high school students, girls are more accurate than boys in judging the meanings of face, body, and vocal nonverbal cues.	×	
65.	Smiles can signal attentiveness and involvement.	×	
66.	In conversation, a more dominant person is likely to show relatively more gazing while speaking than while listening, compared to a less dominant person.	×	
67.	Women are gazed at less than males.		×
68.	Among adults, females touch others more than males do.	×	

Appendix (*Continued*)

Question		True	False
69.	Shy people gaze more.		×
70.	Sadness is not easily identified from a person's voice.		×
71.	People with high affiliative needs tend to glance and return glances more often.	×	
72.	Side positions at tables convey leadership.		×
73.	You gaze more when you want to be included.	×	
74.	Joy is not easily identified from a person's voice.		×
75.	When you want to continue talking in a conversation you are likely to pause more.		×
76.	How close you sit to another person is not a function of how interpersonally close your relationship is.		×
77.	Anger is not easily identified from a person's voice.		×
78.	We raise or drop pitch at the end of a comment to signal the end of a speaking turn.	×	
79.	People approach both high and low status others more closely than they approach equal status others.		×
80.	People depart more hastily from a male invading their space than from a female invading their space.	×	
81.	You gaze more at strangers when you are physically close to them.		×

Note: The correct answer is marked for each item.

Notes

1. When TONCK items pertaining only to the face or emotion were examined, there was no relation with the DANVA 2-AF ($r < .05$). Thus, when those TONCK items were isolated that had the best *a priori* match in content to the DANVA 2-AF (face items and emotion items), there was still no relation. One possible explanation is that the face and emotion items on the TONCK were only a small subset of all the items and, moreover, the content areas represented in those items may not have optimally measured knowledge in those subdomains.
2. Motivation was manipulated, but this manipulation had no effect, so it will not be discussed further.

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