Assessing the Validity of Computerized Scoring of the LEAS

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ABSTRACT

The Levels of Emotional Awareness Scale (LEAS; Lane & Schwartz, 1987) is an open-ended measure of the depth and breadth of one's knowledge of emotion concepts. This is an important aspect of Emotional Intelligence, which is the ability to perceive, understand and manage emotions in oneself and others. Previously, the LEAS was always scored by hand according to criteria described in the scoring manual (Lane, 1991). Hand-scoring the LEAS is an extremely time-consuming process. To accelerate LEAS scoring, a computer program (Leaf, 2003) was created to score the test. Because the computer program cannot perfectly implement the subjective scoring rules contained in the manual, the program was designed to calculate scores in three different ways. The purpose of this study is to assess the effectiveness and validity of the three different computerized scoring methods in comparison to hand-scoring. In this study, 52 undergraduate students completed the LEAS on paper. These were hand-scored by trained research assistants as well as by the new computer program. We correlated each of the three computer-calculated scores with the scores obtained from hand-scoring. The three correlations were all high. The best of these three scoring methods was the technique that was designed to most closely mimic human scoring. Some minor limitations of the program, as it is currently written, were revealed by this analysis. A revision to the program is now being written, and a future study will examine the validity of the scores generated by the program. With further revisions and additional research, the computerized scoring of the LEAS will be even more successful. Most psychological measurements use closed-ended questions because of the ease of scoring. This research suggests that using open-ended measures (with computer scoring) may be feasible in a wide variety of research and applied settings.

INTRODUCTION

The Levels of Emotional Awareness Scale (LEAS; Lane & Schwartz, 1987) is an open-ended measure of emotional intelligence, designed to measure the depth and breadth of one's knowledge of emotion words. Knowledge of emotion concepts is one important facet of Emotional Intelligence (EI), which can be defined as the ability to perceive, understand and manage one's emotions and the emotions of others.

The LEAS consists of 20 open-ended questions, and is scored by hand according to the instructions given in the scoring manual (Lane, 1991). Hand-scoring has two major disadvantages. First, the process of scoring a response is time-consuming. Experienced scorers can score the 20 items from a single subject in about 10 minutes, but less experienced scorers often take 20 minutes or more per subject. As well, scoring is somewhat subjective. Often a LEAS scorer will have to make decisions about whether or not two words are synonyms and how the context of a word changes its interpretation.

Because hand-scoring is so time-consuming, the first author undertook to develop an objective computerized scoring program for the LEAS, the CompLEAS. The purpose of this study was to see how well scores produced by the CompLEAS would correlate with those produced by hand-scoring.

METHOD

Participants

Data was collected from 52 undergraduates who had completed the LEAS as part of a larger study for course credit. Subjects ranged in age from 18 to 43, with a mean of 19.8. Approximately 2/3 of the subjects were female.

Measures

LEAS

The LEAS (Lane & Schwartz, 1987) is a 20-item open-ended measure of emotional intelligence. For each item, participants imagine themselves in a scenario that involves another person. Participants write down how they would feel in the situation and how the other person would feel. To score the LEAS, the rater reads the response, looking for emotion-words. Each emotion-word or phrase has a specific value [0 – 3], as described in the scoring manual. Based on the scores for the individual words used, each item is then given a score [0 – 4] for the emotional response of the self (Self score) and a separate score [0 – 4] for the emotional response for the other person mentioned (Other score). Based on the scores for Self and Other, each item is given a Total score [0 – 5]. According to Lane, Quinlan, Schwartz, Walker, and Zeitlin (1990), these Total scores reflect five levels of emotional awareness: "bodily sensations, action tendencies, single emotions, blends of emotion, and combinations of blends" (p. 125). Total scores are summed across items to get the total score on the LEAS.

CompLEAS

CompLEAS is a computer program designed to score the LEAS. The CompLEAS program does not exactly mimic human scoring, however. Many of the scoring rules in the LEAS manual are subjective and cannot be easily converted into computer algorithms. For instance, distinguishing whether a particular emotion is related to Self or Other would be extremely complicated for a computer program. As well, whether or not two words are synonyms (which influence the scores for Self and Other) often depends on context. Thus, CompLEAS uses three different scoring methods that attempt only to approximate hand-scoring.

The fundamental procedure of CompLEAS is to go through each response and pick out words or phrases that appear in the scoring manual's wordlist. In CompLEAS, these words and phrases are called "valuables." Each valuable has a point value [0 – 3]. In cases where a valuable has more than one value (depending on context), the most common value was used.

In each response the valuables are extracted and placed in a list. This list also contains the value associated with each valuable. The scoring methods then operate on this list of valuables and their values.

The AllSum method simply takes the sum of all the values in the response.

The Highest-4 method calculates the sum of the four highest values in the response.

The 334 method takes the highest value in the response. However, if two different valuables both have a value of 3, then the total score will be 4. For example, the words "happy" and "delighted" both have the value 3. If a response contains "happy" and "delighted" its total score will be four. However, if a response contains "happy" and then later on "happy" appears again and if there are no other valuables worth 3, the total score for this response will be 3. The 334 method was designed to mimic the scoring rule that gives a score of 4 when two or more level 3 emotions are present and distinguishable from each other, and is conceptually the closest to the hand scoring method. Because the CompLEAS cannot distinguish between Self and Other in responses, it is not possible for a response to get a score of 5 as described in the manual.

Regardless of which method was used to calculate total scores for an individual item, the scores were then summed across the 20 items to obtain the total scores for each subject.

Procedure

Each participant's LEAS was hand-scored by humans according the LEAS scoring manual. Participants' response data was then typed into the computer and formatted to be read by CompLEAS. CompLEAS was run on each participant's data set and total scores were calculated by each of the three scoring methods. The correlation between the total scores for each CompLEAS scoring method and the hand-scoring total scores was calculated using SPSS 11.5.

RESULTS

Table 1 shows the correlations between the three CompLEAS total scores and the hand-scoring results. While all of the scoring methods had strong correlations, the 334 method had the highest.

Table 1
Correlations between CompLEAS-generated and human-generated LEAS scores

CompLEAS scoring method	Correlation with hand-scoring
AllSum	.819
Highest-4	.845
334	.906

DISCUSSION

This study examined the correlation between LEAS scores generated by the CompLEAS program and those generated by hand-scoring. Three different scoring methods are used within the CompLEAS program. All three methods had high correlations with the human-generated scores.

There are several ways the CompLEAS program could be improved, however. First, research participants often making spelling errors. In the future it would be helpful to include a spell-checking module in the CompLEAS program, so that spelling errors can be corrected automatically. As the program is currently written, words that are misspelled will not be recognized as valuables, and they will receive no points.

Second, the word list used by CompLEAS was copied from the LEAS scoring manual. This word list contains gender specific pronouns. The word list also contains phrases, such as "lose one's cool", which would never be literally written in a response. The CompLEAS wordlist should be revised so that it is gender neutral, but also the indefinite pronoun "one" must be changed. The new wordlist could contain a wildcard pronoun, "PN", such that "he", "she", "they", etc. would match it.

Third, the first author noticed a flaw in the design of CompLEAS, while analyzing the data. CompLEAS uses a list structure, where each valuable exists as a separate item. This list structure is difficult to search recursively. Because of this, it is possible that certain values in the response will be missed. A revision of CompLEAS will fix this problem by using a tree structure in which phrases that start with a sequence of identical words will branch from the same roots.

Fourth, the LEAS manual asks human scores to decide whether a word or phrase is referring to Self or Other. No simple method exists for the computer to make this distinction. A new form of the LEAS is being designed that will ask participants to describe the emotions of the self and the emotions of the other in separate boxes. A revision of CompLEAS will be made to accept data in this split self/other response format. This will allow CompLEAS to calculate scores based on Self and Other, similar to the method prescribed in the manual. The CompLEAS Self / Other distinction will not be identical to the distinction made by human scorers, however, because research participants often describe the emotions of the Self when talking about the emotional response of the Other. For example, a subject might say "The other person would feel bad about hurting me", where the Self feels "hurt" and the Other feels "bad". Despite this limitation, the creation of separate sections for responses for the Self and Other are likely to allow the computer program to produce a total score that is even more similar to the hand-scoring than the current algorithm.

While the scores generated by CompLEAS had high correlations with human-generated scores, there is still much room for improvement in CompLEAS. A revised version of the CompLEAS is now being written that will incorporate all of the revisions mentioned above. After this revised program is written, the CompLEAS total scores will again be compared to the scores obtained from hand-scoring. This future study should reveal even higher correlations between the two scoring methods.

Typically, psychological research uses closed-ended response formats, such as true/false, multiple choice, or likert-type scales. One of the primary reasons for a focus on closed-ended response formats is objectivity and speed of scoring. In contrast, open-ended response formats can lead to subjective and time-consuming scoring processes, as is the case with the LEAS. The present study has demonstrated that computerized scoring of open-ended responses can produce objective scores and can be efficient. Future research should examine other uses for computerized scoring of open-ended responses.

REFERENCES

Lane, R. D. (1991). *LEAS scoring manual and glossary*. Unpublished test manual. Available from Richard D. Lane, Department of Psychiatry, University of Arizona Health Sciences Center, Tucson Arizona, 85724.

Lane, R. D., Quinlan, D. M., Schwartz, G. E., Walker, P. A., & Zeitlin, S. B. (1990). The Levels of Emotional Awareness Scale: A cognitive-developmental measure of emotion. *Journal of Personality Assessment, 55,* 124-134.

Lane, R. D., & Schwartz, G. E. (1987). Levels of emotional awareness: A cognitive-developmental theory and its application to psychopathology. *American Journal of Psychiatry, 144,* 133-143.

Leaf, D. E. (2003). *Computerized Scoring Program for the LEAS*. Unpublished computer program. Available from Kimberly A. Barchard, PO Box 455030, 4505 S. Maryland Parkway, Las Vegas, NV, 89154-5030.