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Letter to the Editor

Dynamic Norming and Open Science

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ABSTRACT

In a recent issue of *JSLHR,* Tucci et al. (2022) presented a method for assigning *SEM* scores to a language sample. However, this method is based on data that are not publicly available and uses a commercial analysis program that is not open source. The TalkBank system and the Child Language Data Exchange System database provides free analysis software based on openly accessible data, thereby adhering to Open Science standards, which represent an important next step for the fields of speech and hearing.

Tucci et al. (2022) show how calculation of the standard error of the mean (*SEM*) can allow clinicians to align language sample measures derived from a target client with those from a larger age-matched comparison set. We agree that ability to perform dynamic score analysis provides an important component in the clinician's arsenal of tools for assessment of children's language development. We also agree that *SEM* values provide one good way of making these assessments. Despite our agreement regarding the value of this approach, we are concerned about several aspects of the report, data, and analysis in Tucci et al.

JSLHR has recently announced a call for papers on "promoting reproducibility for the speech, language, and hearing sciences." However, this laudable effort is not commensurate with the journal's recent publication of a set of analyses by Tucci et al. (2022) based on a privately held dataset that is tightly linked to a specific commercial product. Open Science practices such as the FAIR (Findability, Accessibility, Interoperability, and Reusability) standards (Wilkinson et al., 2016) require that data be publicly available for further analysis and replication. This means that the software for conducting replicable analyses must also be open source and freely available. Unfortunately, the data on which Tucci et al. base their analysis is not openly available. Moreover, to compare a new transcript with this unshared comparison database, one must purchase a proprietary piece of software that is not open source.

Despite statements in Tucci et al. (2022) to the contrary, there is an alternative method for conducting dynamic norming that is in full accord with Open Science standards. This method uses the open data in the Child Language Data Exchange System (CHILDES) and the freely available open-source Computerized Language ANalysis (CLAN) programs developed in the context of the TalkBank project (MacWhinney, 2000, 2019). In 2015, TalkBank configured the CHILDES database to permit dynamic score assessment of a target language sample through the KIDEVAL program (Bernstein Ratner & MacWhinney, 2016; Overton et al., 2021). Use of this program is documented in Section 8.8 of the CLAN manual, which is freely downloadable from https://talkbank.org/manuals/CLAN.pdf. For English, the program allows users to compare a single target transcript or a collection of targets with over 2,000 comparison files from the larger English CHILDES database. The comparison is based on precompiled values for transcripts in 6-month groupings with far more than 35 samples in each of the twelve 6-month groups. The comparison can be further filtered for sample size in terms of utterances, gender (male, female), activity type (narrative, interview, free play), design (cross-sectional, longitudinal), clinical status (typically developing, atypical), and comparison with an alternative age group. Because CHILDES files include automatically computed morphosyntactic analyses, the program can also automatically compute all the mean length of utterance measures used by Systematic Analysis of Language Transcripts (SALT), along with the Developmental Sentence Score

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(DSS; Lee, 1974), the Index of Productive Syntax (IPSyn; Scarborough, 1990; see also MacWhinney et al., 2020), values on the 14 grammatical morphemes studies by Brown (1973), and several measures of lexical diversity. In all, KIDEVAL produces outcomes on 41 variables that are output to a .csv file for possible further analysis by Excel and statistical programs. For each of these 41 variables, KIDEVAL includes the standard deviation score with significance levels for the target transcript in relation to the comparison group.

From the viewpoint of clinical evaluation, there are limitations inherent in the measures tracked in Tucci et al. (2022), as well as similar measures produced by Sampling Utterances and Grammatical Analysis Revised (SUGAR; Pavelko & Owens, 2017). These measures, such as length of utterance and words per minute, evaluate children's language primarily in terms of quantity or volubility. While potentially useful in identifying or diagnosing less talkative children who may have expressive language limitations, such measures are less than ideal in providing clinicians with concrete strategies for furthering children's syntactic or grammatical growth. They provide clinicians with little guidance in constructing language goals other than to "say more" or "make utterances longer." This point is made in articles by Guo et al. (2018), Pezold et al. (2019), Finestack et al. (2020), and Yang et al. (2022), all of which use CLAN assessment and are published in ASHA Journals.

In contrast to the quantity measures in SALT and SUGAR, assessment through KIDEVAL produces a profile across 41 variables including details on lexicon, morphology, and syntax, which can be further supplemented through automatic running of DSS and IPSyn (Yang et al., 2022). These Open Science tools provide the clinician with information on the specific aspects of language along which the target child diverges significantly from comparison group norms, rather than just measures of output quantity. Moreover, language samples created with CLAN can easily be linked directly to the audio recording on the utterance level, permitting additional analysis for fluency and interactional features, and they can be analyzed for phonological development and disorders by using the fully compatible and freely available Phon program (Rose & MacWhinney, 2014).

Given the fact that KIDEVAL has been openly available since 2015 (Bernstein Ratner & MacWhinney, 2016; Garbarino et al., 2020), it is surprising to find Tucci et al. (2022) describing SALT as the first available utility to perform dynamic norming of children's expressive language skills. KIDEVAL has been openly available to perform this function at no cost for the past 6 years, in contrast to this very recent development for dynamic score assessment based on nonshared data linked to a commercial product. Moreover, TalkBank provides two other programs with structures like KIDEVAL but targeted to other areas relevant to speech and language science. These are the EVAL program (Forbes et al., 2012) for analysis of language in aphasia and the FLUCALC program (Bernstein Ratner & MacWhinney, 2018) for analysis of developmental stuttering.

It is important for the field to be able to evaluate and compare alternative methods for computer-assisted language sample analysis. However, it is equally important that this process be accompanied by open access to data and full sharing of analysis tools and methods, and it is incumbent on our journals to begin to implement this policy.

Author Contributions

Brian MacWhinney: Conceptualization (Equal), Methodology (Equal), Writing – review & editing (Equal). **Nan Bernstein Ratner:** Conceptualization (Equal), Methodology (Equal), Writing – review & editing (Equal).

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