A Quarter Century of *The Analysis of Verbal Behavior*: An Analysis of Impact

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The Analysis of Verbal Behavior (TAVB) has been published since 1982, and during this time, interest in verbal behavior research appears to have increased substantially within behavior analysis. The purpose of the present analysis was to assess the influence of *TAVB* on the field by (a) counting citations of *TAVB* articles in the *Journal of the Experimental Analysis of Behavior (JEAB)* and the *Journal of Applied Behavior Analysis (JABA)* from 1983 through 2007, (b) examining which other journals cite *TAVB*, and (c) calculating impact-factor estimates for 2003 through 2007. Citations of *TAVB* articles began to appear in *JEAB* and *JABA* in the late 1980s to early 1990s, and by the end of 2007, almost a third of all articles published in *TAVB* had been cited in either *JEAB* or *JABA*. Other journals that cite *TAVB* include *The Behavior Analyst* and *The Psychological Record*. The estimated impact factor ranged from 0.267 to 0.600. Strategies for increasing the impact of *TAVB* are discussed.

Key words: *The Analysis of Verbal Behavior*, impact factor

In 1982, the Verbal Behavior Special Interest Group (VB-SIG) of the Association for Behavior Analysis International (ABAI; then Association for Behavior Analysis) initiated the publication of a newsletter titled *VB News* (see M. L. Sundberg, 1997, for a detailed history). Starting with its third volume, the title of the newsletter was changed to *The Analysis of Verbal Behavior (TAVB)*, and the content of the first two volumes was later reprinted under the new title. Peer review was then initiated with the establishment of an official board of editors, starting with Volume 4 in 1986 (Mark Sundberg, personal communication, September 30, 2008). The VB-SIG continued to publish *TAVB* for several years under the editorship of Mark Sundberg, with financial support from B. F. Skinner and Jack Michael, among others (M. L. Sundberg, 1997). Since 1997, the journal has been published by ABAI. A total of 24 volumes have been published to date; no volume was published in 1984, and Volumes 12 and 18 covered 2 years each (1994–1995 and 2001–2002, respectively). From the beginning, the journal was intended to promote and disseminate

research and conceptual advances on language from a behavioral perspective, and in particular, the perspective advanced by Skinner (1957) in *Verbal Behavior* (Michael, 2000; M. L. Sundberg). Since its inception, *TAVB* has published empirical and conceptual articles on a wide variety of verbal behavior topics. They have included, but not been limited to, the functional independence of verbal operants (e.g., Hall & Sundberg, 1987; Partington & Bailey, 1993; Twyman, 1996), selection-based versus topography-based verbal behavior (Michael, 1985; Polson & Parsons, 2000; Potter & Brown, 1997; C. T. Sundberg & Sundberg, 1990), automatic reinforcement (e.g., Miguel, Carr, & Michael, 2002; M. L. Sundberg, Michael, Partington, & Sundberg, 1996), rule-governed behavior (e.g., Braam & Malott, 1990; Reitman & Gross, 1995), private events (e.g., Palmer et al., 2004), the relationship between stimulus equivalence and verbal behavior (Barnes, Hegarty, & Smeets, 1997; Barnes, McCullagh, & Keenan, 1990; Hall & Chase, 1991), second and foreign language acquisition (Houmanfar, Hayes, & Herbst, 2005; Shimamune & Jitsumori, 1999; Washio & Houmanfar, 2007), and applications to language interventions (e.g., Greer & Yuan, 2008; Ziomek & Rehfeldt, 2008).

At the time of *TAVB*'s inception, few empirical articles had made use of Skinner's

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(1957) conceptualization of verbal behavior (Dymond, O'Hara, Whelan, & O'Donovan, 2006; Oah & Dickinson, 1989). During the lifetime of *TAVB*, however, interest in verbal behavior research appears to have increased within behavior analysis. Theoretical extensions of Skinner's analysis have been advanced (e.g., Hayes, Barnes-Holmes, & Roche, 2001; Horne & Lowe, 1996), and basic and applied research on verbal behavior now appears frequently in the two major behavior-analytic journals, the *Journal of the Experimental Analysis of Behavior* (*JEAB*) and the *Journal of Applied Behavior Analysis* (*JABA*). Recent examples from *JEAB* include a series of studies related to Horne and Lowe's naming hypothesis (Horne, Hughes, & Lowe, 2006; Horne, Lowe, & Harris, 2007; Horne, Lowe, & Randle, 2004; Lowe, Horne, Harris, & Randle, 2002; Lowe, Horne, & Hughes, 2005) and a study on the development of derived verbal relations in an infant (Luciano, Gómez-Becerra, & Rodríguez-Valverde, 2007). In *JABA*, studies have recently been published on the assessment and training of basic verbal operants (e.g., Kelley, Shillingsburg, Castro, Addison, & LaRue, 2007; Lerman et al., 2005) and on variables that influence the emergence of untrained verbal relations (e.g., Hernandez, Hanley, Ingvarsson, & Tiger, 2007; Ingvarsson, Tiger, Hanley, & Stephenson, 2007; Murphy, Barnes-Holmes, & Barnes-Holmes, 2005). Although the empirical literature remains small and may be limited to research on the basic verbal operants described in the early chapters of Skinner's book (Dixon, Small, & Rosales, 2007), it has grown substantially in recent decades (Dymond et al., 2006; Sautter & LeBlanc, 2006). Dymond et al. reported that the frequency of annual citations of *Verbal Behavior* had increased by 61% since an earlier analysis by McPherson, Bonem, Green, and Osborne (1984), and that the proportion of citations found in empirical articles had increased by 119% in the same period.

The extent to which *TAVB* has participated in this trend has not been formally evaluated. Now that the journal has been published for over a quarter of a century, the time has come to assess the impact of its contributions. In the present analysis, we employed three approaches to assess the influence of *TAVB*

on the literature, assuming that journal influence may be broadly construed as the use of journal content by researchers, and that citation rates may provide potentially relevant measures of it. First, we assessed the level and trend of citations in *JEAB* and *JABA* from 1983 through 2007. Because these journals are often considered the flagship empirical journals within behavior analysis, citations therein should be indicative of *TAVB*'s impact on its own scientific community. As a supplement to this analysis, we assessed the cumulative number of articles published in *TAVB* that had been cited in *JEAB* and *JABA* by the end of 2007. These data were intended to evaluate whether increases in citation rates were better accounted for by repeated citations to a few influential articles, or by lower levels of citations to many different articles. Second, in order to determine in which other journals *TAVB* might be cited, we analyzed citation data that were available in the PsycINFO database for *TAVB* articles published from 2001 through 2007. Third, we calculated an estimated impact factor for *TAVB* for 2003 through 2007. The journal impact factor (Garfield, 1972) is a statistic published annually by the Thomson Institute for Scientific Information (ISI) in *Journal Citation Reports* (*JCR*) for a large number of journals that the ISI indexes for its databases. The impact factor is sometimes interpreted as a measure of journal prestige or quality (Garfield, 2003), and as such appears to correlate with expert ratings (Saha, Saint, & Christakis, 2003); however, it may be better conceived of as a measure of journal visibility (Hantula, 2005; Sammarco, 2008) or how much a journal is read. A journal's impact factor is calculated for each year based on how often recently published articles from that journal are cited in all journals that are indexed by ISI, and takes into account the total number of articles published in the target journal. *TAVB* is not currently indexed in the ISI databases, and therefore does not have an official impact factor. However, citation information available in the PsycINFO database provides a relatively straightforward way to estimate it, assuming that *TAVB* articles are primarily cited within the psychological and related literature (journals in speech-language pathology and special edu-

cation, e.g., are usually indexed in PsycINFO). The years 2003 through 2007 were selected for analysis because they were the same 5 years for which impact factor data were available in *JCR* at the time the analysis was conducted.

METHOD

Citations in JEAB and JABA

All issues of *JEAB* and *JABA* from 1983 through 2007 were coded as follows. The number of articles published per year was tallied by hand, excluding any content that did not have a reference section. Total citations per year were tallied by hand in volumes published prior to 2001. For volumes published from 2001 through 2007, total citations were obtained by summing the number of cited references reported for each article in PsycINFO (at the time of the analysis, this information was not available in the database for *JEAB* and *JABA* volumes published prior to 2001). Finally, the reference section of each article published during the period was examined for citations to *TAVB*. When a citation was found, it was recorded along with identifying information on the *TAVB* article cited and the year it was cited in *JEAB* or *JABA*. In addition, a tally was kept on the number of *JEAB* and *JABA* articles per year that contained at least one citation to *TAVB*.

A second observer independently scored 10 randomly selected volumes of each journal. Interobserver agreement was assessed for (a) the frequency of *JEAB* and *JABA* citations of *TAVB* articles, (b) the number of articles published per year in *JEAB* and *JABA*, and (c) the total number of citations in *JEAB* and *JABA*. A frequency ratio percentage agreement was calculated for each year by dividing the lower number by the higher number and multiplying by 100%. Average agreement was 92% for *JEAB* and 98% for *JABA* on citations of *TAVB* articles; 99.8% for *JEAB* and 99% for *JABA* on number of articles published; and 99% for *JEAB* and 97% for *JABA* on total number of citations.

Citations in Other Journals

A PsycINFO search was conducted for all articles published in *TAVB* from 2001

through 2007. This search yielded information on the number of times each *TAVB* article had been cited by all sources indexed in PsycINFO as of February 6, 2009. The analysis began at 2001, because at the time of data collection, PsycINFO appeared to reliably include reference list information only from journal content published 2001 and later. For each article, the number of citations in other journals was recorded along with the names of the citing sources. An author self-citation was recorded if a citing article included at least one of the same authors as the article that it cited.

Estimated Impact Factor

An estimated impact factor for each year from 2003 through 2007 was calculated in a manner consistent with *JCR*'s impact-factor calculations. The impact factor for a given year is defined as a ratio of (a) the number of that year's citations to articles published in the target journal in the two previous years to (b) the total number of citable items published in the target journal in the two previous years. The information necessary to obtain the numerator and denominator terms was compiled with the aid of the PsycINFO database and the ISI Web of Knowledge (v. 4.4) database. The denominator term for year X was obtained by counting the total number of *TAVB* articles published in years $X - 1$ and $X - 2$ that were listed in the PsycINFO database, excluding editorials (e.g., the 2007 denominator consisted of the total number of articles published in 2005 and 2006, according to *PsycINFO*). The numerator term for year X was the number of citations to *TAVB* articles published during years $X - 1$ and $X - 2$ that appeared in ISI-indexed journals, in addition to citations that appeared in *TAVB* itself (citations that appeared in *TAVB* were counted because if *TAVB* were indexed by ISI, then citations from *TAVB* would be included in impact-factor calculations). To obtain this information, a PsycINFO search was first conducted for articles published in *TAVB* from 2001 through 2006. This search yielded information on the number of times that each article had been cited by sources indexed in PsycINFO by October 28, 2008. For each article, the list of citing sources was exam-

Figure 1. Citations of *TAVB* articles in *JEAB* (left) and *JABA* (right) from 1983 through 2007. Upper panels show citations of *TAVB* articles as a percentage of the total number of citations. Lower panels show the percentage of articles that cited one or more *TAVB* article.

ined and citations from professional journals counted if they had appeared in the 2 years following the publication year (for articles published in 2006, only citations from 2007 were analyzed). When a citation appeared in a journal other than *TAVB*, a search for that journal was conducted in the ISI database, and the citation was excluded from the citation count if the journal was not indexed. After this analysis had been completed, the numerator term for each year could be derived.

RESULTS AND DISCUSSION

Citations in JEAB and JABA

Figure 1 shows citations to *TAVB* in *JEAB* and *JABA* from 1983 through 2007. *TAVB* articles accounted for a small percentage of citations in both journals during this period, ranging from 0% to 1.5% in *JEAB* and from 0% to 1.7% in *JABA*. Occasional citations to *TAVB* began to appear in *JEAB* in the late 1980s. Citation rates increased through the mid-1990s, but appear to have decreased after 2000, with the exception of a spike in 2004. *JABA* citations to *TAVB* began to appear in the early 1990s, and a small

increasing trend continued throughout 2007. In the most recent 5 years included in the analysis, *TAVB* articles accounted for a total of 0.3% of all citations in *JEAB* and 0.8% in *JABA*. By comparison, *JABA* articles accounted for 0.6% of all citations in *JEAB* between 1993 and 2003, and at the same time, *JEAB* articles accounted for 7.8% of all citations in *JABA* (Elliott, Morgan, Fuqua, Ehrhardt, & Poling, 2005).

Figure 1 (bottom panels) depicts the percentage of articles published in *JEAB* and *JABA* that have cited at least one *TAVB* article. This percentage ranged from 0% to 14.3% in *JEAB*, and from 0% to 9.1% in *JABA*. Prior to 2001, a greater percentage of *JEAB* than *JABA* articles cited *TAVB*, but this percentage has since been similar in both journals, following increased citations in *JABA* and decreased citations in *JEAB*. The data generally correspond to the data in the top panels, indicating that years with higher percentages of citations tended to be years in which more articles cited *TAVB* rather than simply years in which a single article happened to cite a large number of *TAVB* articles. An exception may be seen, for example, in *JEAB* in 1996, at which time a spike in the percentage of citations was not

Figure 2. The cumulative number of *TAVB* articles cited in *JEAB* and *JABA* from 1983 through 2007.

accompanied by a spike in the percentage of articles that cited *TAVB*. In that year, all 29 citations of *TAVB* appeared in only three articles, most of them in Horne and Lowe (1996).

Although the percentages in Figure 1 seem low, they nevertheless indicate that a sizable portion of articles published in *JEAB* and *JABA* are to some extent influenced by *TAVB* content. Further, it is possible that this influence is increasing in *JABA*, although more data are needed to verify the trend. However, one variable that was not systematically analyzed was the extent to which authors' self-citations might account for *TAVB* citations in *JEAB* and *JABA*. If authors who publish in *TAVB* also publish in *JABA* or *JEAB*, and further tend to cite their own work, then it is possible that *TAVB* citations in those journals do not reflect an influence of *TAVB* publications per se, but simply reflect common authorship. Although no formal assessment of this possibility was conducted, we examined the seven *JABA* articles that cited *TAVB* in 2007 and found that none of them shared any authors with any of the 22 *TAVB* articles that they cited. Thus, at least in that volume, citations of *TAVB* articles appear to reflect consumption of *TAVB* content by researchers other than the authors.

Figure 2 shows the cumulative number of *TAVB* articles that were cited at least once in either *JABA* or *JEAB*. By 2007, a total of 84 articles had been cited in one or both of these journals, or 32% of all articles that had been published in *TAVB* at that time. These data indicate that *JEAB* and *JABA* citations of

TAVB articles cannot be accounted for by one or a few influential articles that are cited frequently. Rather, many different articles appear to have received attention. In *JEAB*, the most frequently cited article was Barnes et al.'s (1990) study on the formation of equivalence relations in children with and without hearing impairments. This article was cited 12 times in *JEAB*, followed by 11 citations to Shimoff (1986), 7 to Catania, Horne, and Lowe (1989), 5 to Lowenkron (1991), and 4 each to Michael (1985), Stikeleather and Sidman (1990), Hall and Chase (1991), and Barnes et al. (1997). In *JABA*, the most cited article was Michael's (1988) conceptual article on establishing operations and the mand, with 8 citations. Hall and Sundberg's (1987) study on mand-tact independence was cited 7 times, followed by 3 citations each to Michael (1985), Lee and Sanderson (1987), and Hall and Chase (1991). These data indicate common interests in certain topics by contributors to the two journals. However, it appears that articles related to stimulus equivalence and its relation to verbal behavior may be of greatest interest to researchers who publish in *JEAB*, whereas articles on the mand may be of particular interest to those who publish in *JABA*. These data also indicate that researchers who publish in both journals have found both conceptual and empirical articles from *TAVB* to be helpful.

Citations in Other Journals

The PsycINFO database contained information on 86 *TAVB* articles published from

Table 1
Citations to TAVB Articles Published
1999–2007

Journal	Number of citations (percentage) ^a
<i>The Analysis of Verbal Behavior</i>	53 (34.6)
<i>Journal of Applied Behavior Analysis</i>	16 (10.5)
<i>The Behavior Analyst</i>	16 (10.5)
<i>The Psychological Record</i>	11 (7.2)
<i>International Journal of Psychology and Psychological Therapy</i>	9 (5.9)
<i>Journal of the Experimental Analysis of Behavior</i>	7 (4.6)
<i>Research in Autism Spectrum Disorders</i>	7 (4.6)
<i>Acta Comportamentalia</i>	4 (2.6)
<i>Behavior and Philosophy</i>	3 (2.0)
<i>Behavioral Interventions</i>	3 (2.0)
Other journals	24 (15.7)
Total	153 (100)

^a According to PsycINFO, February 6, 2009.

2001 through 2007. At the time of the analysis, PsycINFO contained information on 153 citations to these articles from professional journals (see Table 1). Of those citations, 27 (17.6%) were author self-citations, and 53 (34.6%) were journal self-citations; that is, citations from *TAVB* itself. The citations appeared in a total of 35 different journals. For journals apart from *TAVB* itself, citations were most frequent in *JABA* and *The Behavior Analyst*, whereas *JEAB* was tied with *Research in Autism Spectrum Disorders* as the sixth most frequently citing journal. Interestingly, the latter journal has only been published since 2007. Together with the apparent increase in *JABA* citations in recent years, citations in this journal may reflect an increased interest in verbal behavior by applied researchers.

It is important to note that more than half of the citations that were recorded from *The Behavior Analyst* and *The Psychological Record*, and almost all of the citations from *International Journal of Psychology and Psychological Therapy* were from articles that commemorated the 50th anniversary of

Skinner's (1957) *Verbal Behavior* (Greer, 2008; Salzinger, 2008; Schlinger, 2008a, 2008b) or evaluated the contributions of this work to the psychological literature (Dixon et al., 2007; Dymond et al., 2006). As a result, the data may not be representative of typical citation levels in those journals. Nevertheless, Table 1 provides an indication that citations to *TAVB* articles may be most likely to appear in other journals that frequently publish behavior-analytic research, as well as in selected applied journals.

Estimated Impact Factor

As shown in Table 2, estimated impact factors for *TAVB* ranged from 0.267 to 0.600 from 2003 to 2007. Actual impact factors for *JEAB* and *JABA* are shown for comparison; the range was 0.747 to 1.407 for *JEAB* and 0.491 to 1.131 for *JABA*.

Appropriate interpretations of impact-factor values may vary across fields of study. However, an impact factor below 1.0 is usually considered low (Hantula, 2005). Perhaps more informative than the absolute value of the impact factor is the impact-factor rank provided by *JCR* for indexed journals in different subject categories. Table 3 shows how *TAVB* would rank among several categories of psychology journals, based on its estimated 2006 and 2007 impact factors (ranks for earlier years were not available in *JCR* at the time the analysis was conducted). The percentile scores show that in most categories, *TAVB* would rank among the bottom 10% of all journals. The data thus indicate that, at present, the journal might not fare well if included among the journals indexed by ISI.

It is important to note that because the number of articles published per year is included in impact-factor calculations, the low impact-factor estimate cannot be attributed to the small size and infrequent publication of *TAVB*. Rather, it must be attributed to a small percentage of articles being cited within 2 years in ISI-indexed journals. Although the citation rate analysis indicated that *TAVB* is cited reliably in *JEAB* and *JABA*, we found that new articles do not necessarily get cited there very quickly. In *JEAB*, for example, no article published in *TAVB* after 2004 had been cited by the end of

Table 2
Estimated Impact Factors for TAVB for 2003–2007

Year	Number of qualifying citations ^a	Articles published ^a	Impact factor estimate <i>TAVB</i>	Impact factor <i>JEAB</i>	Impact factor <i>JABA</i>
2003	3	8	0.375	1.222	0.875
2004	4	15	0.267	1.407	1.131
2005	15	25	0.600	0.747	0.846
2006	10	34	0.294	1.221	0.491
2007	13	37	0.351	1.180	0.727

^a According to PsycINFO, October 28, 2008.

2007. As a result, the impact-factor estimates rarely included citations from *JEAB* or *JABA*. There are several possible reasons for this citation delay. One potential reason is that material published in *TAVB* simply does not get noticed very quickly, perhaps because researchers do not read the journal on a regular basis, and cite it mostly when relevant articles turn up in literature searches or in secondary sources. If this is the case, then the low impact-factor estimates might be a valid indicator of limited influence. On the other hand, at least two alternative explanations must be considered. One is publication lag. A journal's impact factor may be affected negatively if it is most likely to be cited in journals that have substantial

lag times. We analyzed the 2007 volumes of *JEAB* and *JABA* for dates of initial submission, keeping in mind that the 2005 and 2006 volumes of *TAVB* were published in May of 2005 and 2006, respectively. In *JEAB*, 57% of all 2007 articles were submitted in or after May, 2006, and 87% were submitted in or after May, 2005. In *JABA*, the corresponding percentages were 44% and 95%. This indicates that the citation delay cannot be completely explained by lack of opportunity for authors to cite articles that had not yet been published. Another potential reason for citation delay is that research in the relevant fields of study is so time consuming that articles that begin to influence other research immediately after their publication do not get cited in published reports of that research until years later. As a result, it has been argued that the inclusion of only the two most recent years in impact-factor calculations may be inappropriate for fields of study in which years of data collection may underlie a single article, as may often be the case in behavior analysis (Hantula, 2005). On the other hand, early citations to an article tend to predict later citations across a variety of journal types (Adams, 2008); thus, the significance of prompt citations should not be completely discounted.

In addition to possible citation delay, it is possible that citation rates are affected by the accessibility of the journal. Although *TAVB* is indexed in PsycINFO, relatively few libraries carry subscriptions to it at present, and at the time of the writing of this article, full-text electronic content is not yet available to libraries or to the general public. As a result, for researchers who do not have personal subscriptions to *TAVB*, the response

Table 3
*Estimated Impact-Factor Rank for TAVB in
 2006 and 2007*

Subject	Estimated impact-factor rank ^a /Number of ranked journals ^b (percentile score)	
	2006	2007
Psychology, applied	53/55 (4)	54/58 (7)
Psychology, clinical	84/87 (3)	83/88 (6)
Psychology, developmental	51/54 (6)	51/53 (4)
Psychology, educational	37/41 (10)	32/39 (18)
Psychology, experimental	69/71 (3)	72/73 (1)

^a Based on estimated impact factors in Table 2.

^b Journals ranked in *JCR* plus *TAVB*.

effort required to access its contents may be high compared to other journals with related content, such as *JEAB*, *JABA*, or *The Psychological Record*.

Finally, the highly specialized nature of *TAVB* may contribute to low citation rates and thus a low impact-factor estimate. In general, journals are cited less often if they are reserved for a small or narrow area of research than if they are broader in scope (Bornmann & Daniel, 2006). Among behavioral journals, low impact factors are not uncommon. Carr and Stewart (2005) compiled 2002 impact-factor data and related measures for 27 ISI-indexed behaviorally oriented journals and found that 13 journals had impact factors below 1.0 and 15 ranked below the 50th percentile. In addition, Table 2 shows that even *JABA* has had relatively low impact factors in recent years, with its 2007 impact factor yielding a rank of 69 among 87 journals in its subject category (clinical psychology), according to *JCR*. Thus, the low impact factor estimates for *TAVB* may simply reflect the small size and possible isolation (Carr & Stewart; Critchfield, 2002) of the behavior-analytic community, thus indicating a problem with the field as a whole.

A few limitations of the data in Tables 1 and 2 should be noted. First, when a journal publishes relatively few articles per year, the impact factor is sensitive to minor fluctuations in the number of citations. For example, Opatrny (2008) reported that a single article published in the voice research journal *Folia Phoniatrica et Logopaedia*, which cited every article published in that journal in the previous 2 years, sufficed to raise the journal's impact factor from 0.66 to 1.44. In *TAVB*, the relatively high estimate for 2005 may have been inflated due to an article by Malott (2005) in which several related articles from the 2004 volume were cited.

Another limitation of these data is that the reliability of the input data provided by PsycINFO is unknown. Anecdotally, we are aware of at least one 2007 *JABA* citation to a 2005 *TAVB* article that did not appear in the PsycINFO database, and for 2003, the number of articles published in *TAVB* according to PsycINFO did not match our hand count. This limitation should be kept in mind when interpreting the data. Finally,

the estimates were based only on citations by journals that were indexed both by PsycINFO and ISI, and thus excluded any citations that may have appeared in journals that are indexed by ISI but not by PsycINFO. If citations of *TAVB* appear in such journals (i.e., in journals that are not psychology related), then the data in Table 1 may be underestimates.

Implications for TAVB

TAVB articles are cited regularly in *JEAB* and *JABA*, and citations may be increasing in *JABA*, but not in *JEAB*. The latter observation is consistent with recent reviews (Dixon et al., 2007; Sautter & LeBlanc, 2006) that suggest that in recent years, empirical research that has made use of Skinner's (1957) framework has been predominantly applied in nature.

The influence of published material is difficult to quantify, and the validity of any such analyses may be debated, the present analyses included. In particular, the impact factor has a number of limitations as a measure of journal influence (for a review, see Hantula, 2005). Nevertheless, a favorable impact factor may be important for a journal. Although intended as an assessment instrument, the impact factor is a variable that may indirectly influence the health of a journal. Universities sometimes use journal impact factors to evaluate the publications of tenure-track faculty, and grant-funding agencies may similarly use them to evaluate the publications of applicants. As a result, researchers may prefer to submit their work to high-impact journals within their field rather than to journals with low impact-factor ranks or journals such as *TAVB* that are not indexed in ISI. In addition to influencing the submission decisions of authors, journal impact factors may influence the subscription decisions of libraries. As a result, a low impact factor or the absence of an impact factor may have negative effects on both submissions to and consumption of a journal.

At the time of *TAVB*'s inception, researchers were having difficulty getting work in verbal behavior published in other journals (Michael, 2000). However, this appears to no longer be the case. A quick count by the first author revealed that in 2007, *JABA* published

at least nine empirical studies that might have been appropriate for *TAVB*, and *JEAB* published at least two, conservatively estimated. In that same year, *TAVB* published seven empirical studies. Thus, it appears that *TAVB* is currently in the position of having to compete with other journals for verbal behavior submissions. Of course, many other variables besides impact factor are likely to influence authors' decisions to submit to particular journals, as well as consumers' decisions to subscribe to particular journals. However, the impact factor may partially capture some of these issues, such as journal visibility and reputation. Therefore, should *TAVB* be indexed by ISI in the future, impact factors higher than the estimates listed in Table 1 would be a worthwhile goal.

An increase in impact factor requires an increase in citations to recent articles published in a journal. A logical requirement for such an increase is adequate circulation, such that researchers have prompt and easy access to the content of the journal. Data are beginning to emerge that indicate that electronic publication may serve to increase journal impact factors (Shen, 2003). In addition to decreased response effort associated with being able to download articles, as opposed to retrieving physical copies from libraries, electronic circulation may serve to increase institutional subscriptions, in that it appears that many libraries will no longer consider subscribing to new journals unless they are published in electronic format. Thus, a journal that is published electronically is likely to be available to more researchers who need to engage in less effortful behavior to access it. It is important to note, however, that electronic availability of archives cannot raise a journal's impact factor unless electronically accessible volumes include the two most recent ones.

A second way to increase citations might be to publish more potentially influential articles. One way this might be accomplished is by inviting submissions by prominent researchers in the field, perhaps in the context of special sections or special issues on particular topics. It appears that the articles most likely to be cited in *JEAB* are conceptual and empirical articles that address the relation between verbal behavior and stimulus equivalence or other derived

stimulus relations. Encouraging or inviting researchers who work in this area to submit their work to *TAVB* might serve to increase the relevance of *TAVB* to basic researchers (assuming that *TAVB* strives to influence both basic and applied science). In addition, it might be possible to identify bridges with other types of human experimental work that has been published in journals such as *JEAB* and *The Psychological Record* in recent years (e.g., Almeida, Arantes, & Machado, 2007; Neuringer, Jensen, & Piff, 2007; Saville, 2009). In the applied domain, the linking of particular verbal behavior topics (e.g., rule-governed behavior, private events) with areas of application (e.g., psychotherapy, organizational behavior management) might potentially serve to broaden the audience of *TAVB*.

A third strategy might be to employ more rigorous editorial standards and reject articles that are unlikely to influence other researchers for methodological or other reasons. Such a strategy might result in a higher impact factor by decreasing the denominator in the formula, because at present, there are a number of *TAVB* articles that have never been cited, according to *PsycINFO*. However, attempts to identify seldom-cited material ahead of time might result in costly false-miss errors. In addition, evidence exists that methodological rigor, although unquestionably desirable for a scientific journal, is not necessarily correlated with impact factor (e.g., Berghmans, Meert, Paesmans, Lafitte, & Sculier, 2003).

Increasing the number of articles published in a journal each year does not by itself raise its impact factor, because impact-factor calculations take into account the total number of articles published. In fact, increasing the number of articles published could potentially lower a journal's impact factor, if the additions had little potential for being useful to other researchers. However, increasing the number of high-quality articles published in *TAVB* per year, perhaps with the addition of a second issue, might increase the absolute number of citations in *JABA*, *JEAB*, and other journals. As a result, the visibility of the journal might increase, which in turn might prompt additional citations. To increase the number of published articles, however, it may be necessary to increase

submissions, perhaps via calls for papers on specific topics or active solicitation of manuscripts at conferences (Michael, 2004).

It is possible, of course, that the number of researchers who take interest in the behavior-analytic view of language and related phenomena is simply too small for any outlet that specializes in verbal behavior to have a large impact on the literature. Although *TAVB* may not be widely read, it may well be that it is extremely useful to the small community of researchers who read it, which in itself may be of importance. Nevertheless, insofar as it is assumed that research in this area has important implications for human behavior in general, low levels of citations to a journal such as *TAVB* perhaps indicate that the size of this community should be of concern.

Finally, it should be kept in mind that citation counts provide only one of many potential measures of the relevance of a journal. The number of citations to a journal may not reflect the usefulness or impact of each article that is cited. In addition, a journal that is not widely cited could nevertheless exert an important influence on non-research activities, such as clinical application (Carr & Stewart, 2005). However, given that *TAVB* must compete with other behavior-analytic journals for submissions and influence, it may be important to monitor citation performance and take steps to improve it.

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