# **BRIEF REPORT**

# THE NEXT GENERATION: AUTHORSHIP TRENDS IN THE EXPERIMENTAL ANALYSIS OF HUMAN BEHAVIOR (1980 - 1999)

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The Experimental Analysis of Human Behavior (EAHB) Special Interest Group has accomplished a great deal in its 22 or so years in operation (see Johnston, 1983). Analyses of publication trends document some of those accomplishments and provide an occasion to reflect on the accomplishments of the EAHB research community (e.g., Buskist & Miller, 1982; Hyten & Reilly, 1992). Recently, Dymond and Critchfield updated and extended existing analyses of EAHB research. Their data show that, despite some variability across years, EAHB continues to be well represented in the Journal of the Experimental Analysis of Behavior (JEAB; Dymond & Critchfield, 2001). Additionally, EAHB research has been appearing in *The* Psychological Record (TPR) with increasing frequency, to the point where more EAHB articles appeared in TPR than in JEAB in recent years (Dymond & Critchfield, 2002). Our analyses, like previous ones (e.g., Dougherty, 1994) also show a robust tradition of investigation of some topics (e.g., stimulus control) but not of others (e.g., choice and preference). Overall, however, we have concluded that EAHB as a sub-discipline is in relatively good health based on the number and variety of research articles published in key iournals.

There are, of course, other objective indices of a field's health and status. For example, one may assess the citation impact of a field's research

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articles (e.g., Critchfield, Buskist, Saville, Crockett, Sherburne, & Keel, 2000). In addition, consistent with the spirit of formal bibliometric techniques (e.g., Glanzel, Schubert, & Czerwon, 1999), one may attempt to examine who, precisely, is contributing to a field's published works. This was the objective of the present article: to focus on authorship trends in key EAHB journals, JEAB First, the proportion of articles published by new and frequent authors during the years 1980 to 1999 was recorded. This interval was selected because previous surveys of EAHB in JEAB indicate that (a) little EAHB research was published before 1980; (b) growth in EAHB was evident during the late 1980s to early 1990s; and (c) EAHB publication rates have not changed systematically since the mid-1990s (Buskist & Miller, 1982; Dymond & Critchfield, 2001; Kollins, Newland, & Critchfield, 1999). Using a similar twenty-year review period, Dymond, Clarke, Dunlap, and Steiner (2000) found declining trends in the number of papers by new authors and an increase in the publications of frequent contributors to the Journal of Applied Behavior Analysis (JABA). Data such as these suggest that a relatively small number of repeat contributors account for the majority of JABA's pages, which should lead to concerns about content and diversity. Analogous concerns might be especially acute in an area like EAHB, which generates fewer empirical reports each year than does applied behavior analysis. Second, the present article determined the most prolific authors in the EAHB and assessed the extent to which their research contributions have been specialized.

#### **METHOD**

Article Selection: All data-based EAHB articles (excluding review, theoretical, and technical articles) published between 1980 and 1999 in *JEAB* and *TPR* were examined (cf. Buskist, Sherburne, &

 $\label{eq:Table 1} Table \ 1$  Description of the categories into which articles were assigned.

#### Content Areas

Behavioral Pharmacology

"Behavioral action of drugs" (Branch, 1991, p. 21) including pharmacologically-mediated effects on operant behavior, and the role of drugs as reinforcers and as

discriminative stimuli

Choice and Preference

"Manipulation of reinforcer frequency, magnitude, or, in general, reinforcer value in concurrent operant procedures" (Buskist & Miller, 1982, p. 140) including research on self-control

Reinforcement & Punishment

"Parametric investigations of human performance on various schedules of reinforcement" (Buskist & Miller, 1982, p. 140) including studies examining conditioned reinforcement, reinforcer type, and reinforcement theory; also analogous investigations of punishment and conditioned suppression; primary focus on illuminating fundamental principles of operant consequences, rather than applying these principles to shed light on other processes.

Social and Verbal Behavior

Empirical studies of social behaviors such as competition, cooperation, and aggression, and studies which involve "the acquisition and maintenance of conversation and vocalization" (Buskist & Miller, 1982, p. 140) including research on instructions, self instructions, rule-governance, and self-reports

Stimulus Control

"Studies dealing with the aspects of generalization and discrimination" (Buskist & Miller, 1982, p. 140), including research on derived stimulus relations; primary focus on illuminating fundamental principles of stimulus control, rather than applying these principles to shed light on other processes.

Critchfield, 1996). Although previous surveys of publication trends in the area have focused exclusively on JEAB, the present study also examined EAHB trends in TPR. The Psychological Record was included in the analysis because it has been receptive to EAHB research historically (Buskist, 1983), often publishes more EAHB articles per issue than JEAB (Buskist et al., 1996; Dymond & Critchfield, 2002), and has published several special issues on the EAHB (e.g., Vol. 33, Winter; Vol. 43, Fall) and one of the area's mostcited sources (Baron & Galizio, 1983; see Critchfield et al., 2000). To determine the types of research questions that EAHB studies have addressed most often, the articles were assigned to content categories (Table 1) derived from those of Buskist and Miller (1982; see Dymond and Critchfield, 2001, for rationale).

Author Categories: For JEAB and TPR, the present analysis sought to evaluate the contributions of veteran investigators, as a measure of stability in the field, and of new

investigators, as a measure of renewal in the field. A new investigator was operationally defined as a first author who had not appeared in a same-journal EAHB article during the preceding 5 years. A veteran investigator was defined as any author of an article who appeared in at least 5 same-journal EAHB articles in the previous 10 years. Using these definitions, the proportion of articles in which a new first author and a veteran author appeared, respectively, was determined.

Observer Training, Article Coding, and Reliability Assessment: Observer training took place in two phases. In the first phase of training, two observers independently applied the region of origin and content categories to EAHB articles in six volumes of JEAB and compared their ratings on an article-by-article basis. No disagreement occurred for region of origin categories. Content disagreements prompted the re-coding of the relevant articles, with results compared as before. Remaining discrepancies were discussed until the observers agreed on category assignments,

definitions, and interpretations. In the second phase of training, the same two observers independently applied the article selection criteria to all articles in six volumes of *TPR*.

Each observer then applied the training experience to the coding of all relevant articles in one of the journals. At least one week later, the observers repeated their evaluations for the years 1993 to 1999. Intraobserver agreement was assessed for each journal by comparing total counts, from the first and second evaluations, for each of the content and region of origin categories. Across categories, mean percent agreement (100 X [lower count/higher count]) was 95% for TPR and 92% for JEAB, with agreement scores for individual categories within a journal ranging from 85% to 100%. Because the first and second evaluations produced similar results, the second one was arbitrarily chosen for use in the final data set.

# **RESULTS & DISCUSSION**

New and veteran authors. Figure 1 summarizes the contributions of new and veteran authors in JEAB (filled circles) and TPR (open circles), from 1980 to 1999 in five-year intervals. The left panel shows that, for *JEAB*, the proportion of EAHB articles contributed by new first authors has held steady across the sampling period at around .50. For TPR, the proportion of articles contributed by new first authors has remained at or above JEAB levels. Overall, the data suggest that EAHB benefits from a steady infusion of new talent. The right panel of Figure 1 shows that, in both JEAB and TPR, the proportion of articles contributed by veteran authors has increased since 1985, although the trend is more pronounced in JEAB.

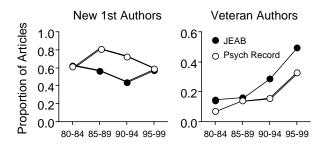


Figure 1

The distribution of new and veteran authors may vary across different research areas, however. A similar trend was found in a recent analysis of the sources cited most frequently in the EAHB, with the majority of the sources addressing issues in (derived) stimulus control (Critchfield, et al., 2000). To address this issue, Table 2 shows the numbers of new first authors and veteran authors from each of the EAHB research content areas listed in Table 1 in JEAB and TPR, respectively. content categories, BP = Behavioral Pharmacology, CP = Choice and Preference, SC = Stimulus Control, RP = Reinforcement and Punishment, SV = Social and Verbal Behavior. Research on basic Reinforcement and Punishment and Stimulus Control processes account for the majority of new first authors in both journals, with the biggest increase in new contributors being evident in Stimulus Control articles published in TPR. Interestingly, Stimulus Control articles published in JEAB account for the highest number of veteran authors across all research categories.

# Table 2

The numbers of new first authors and veteran authors from each of the EAHB research content areas listed in Table 1 in *JEAB* and *TPR*, respectively. BP = Behavioral Pharmacology, CP = Choice and Preference, SC = Stimulus Control, RP = Reinforcement and Punishment, SV = Social and Verbal Behavior.

IFA B	BP	СР	SC	RP	SV
New First Authors	13	27	60	71	46
Veteran Authors	4	4	18	8	4
TPR	_	•	~0	0.0	4.00
New First Authors	5	9	79	63	47
Veteran Authors	0		7	7	4

Most prolific authors. To provide a more detailed estimate of who has contributed what to EAHB, a list was compiled of the investigators (N = 42) who have contributed the most EAHB articles in JEAB and TPR combined, during the sampling period (see Table 3). The only criteria for inclusion in this list was the publication in either journal of at least 5 articles in which an individual was named as an author. Content categories checked in Table 3 are those to which an author contributed at least one article during the census period. As an aside, only 7 of the authors - 5 from Europe, 1 from Australia, and 1

author who listed, at different times, affiliations in both Australia and North America - had affiliations outside the North America, although 4 of these were among the 20 most prolific authors.

Because the content categories employed are not mutually exclusive, authors could contribute to multiple categories with each article. The topical interests of EAHB's most prolific investigators are addressed in Figure 2, which shows the proportion of the 42 most prolific individuals listed in Table 3 who contributed to each of the five article content categories defined in Table 1. The research categories of Stimulus

Table 3

Most prolific EAHB authors (1980 - 1999)

Author	Cont	tont (	atag	orios		# Antial	0.5		
Author	BP		Categ SC	RP	SV	# Articl <i>JEAB</i>	es <i>TPR</i>	Total	
	DI	CI	SC	IVI	5 V	JLAD	11 II	Total	
Barnes-Holmes D.				$\sqrt{}$	$\sqrt{}$	6	16	22	
Fields L.			Ì	•	·	6	11	17	
Buskist W. F.				$\sqrt{}$	$\sqrt{}$	3	11	14	
Adams B. J.						5	8	13	
Hayes S. C.			$\sqrt{}$		$\sqrt{}$	9	3	12	
McIlvane W. J.			$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	7	5	12	
Bickel W. K.					$\sqrt{}$	9	2	11	
Critchfield T. S.			$\sqrt{}$		$\sqrt{}$	8	3	11	
Dube W. V.			$\sqrt{}$			7	4	11	
Cherek D. R				$\sqrt{}$	$\sqrt{}$	4	6	10	
Smeets P. M.			$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	1	9	10	
Bennett R. H.	$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	2	7	9	
Higgins S. T.	$\sqrt{}$	$\sqrt{}$			$\sqrt{}$	7	2	9	
Spradlin J. E.			$\sqrt{}$			7	2	9	
Verhave T.			$\sqrt{}$			3	6	9	
Hayes L. J.			$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	3	9	9	
Crosbie J.			$\sqrt{}$		$\sqrt{}$	2	5	7	
Green G.			$\sqrt{}$			6	1	7	
Keenan M.			$\sqrt{}$		$\sqrt{}$	2	5	7	
Perone M.			$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	6	1	7	
Reeve K. F.			$\sqrt{}$			5	2	7	
Saunders K. J.			$\sqrt{}$			5	2	7	
Saunders R. R.			$\sqrt{}$			5	2	7	
Sidman M.			$\sqrt{}$			6	1	7	
Bentall R. P.			$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	3	3	6	
DeGrandpre R. J.		$\sqrt{}$		$\sqrt{}$	$\sqrt{}$	4	2	6	
Dougherty D. M.		$\sqrt{}$		$\sqrt{}$	$\sqrt{}$	2	4	6	
Griffiths R. R.	$\sqrt{}$	$\sqrt{}$		$\sqrt{}$	$\sqrt{}$	5	1	6	
Hughes J. R.						5	1	6	
Lane S. D.		$\sqrt{}$	$\sqrt{}$		$\sqrt{}$	3	3	6	
Miller H. L.		$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	1	5	6	
Stromer R.			$\sqrt{}$			3	3	6	
Wulfert E.			$\sqrt{}$			3	2	5	
Baron A.			$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	4	1	5	
Chase P. N.			$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	5	0	5	
Dougher M. J.			$\sqrt{}$	$\sqrt{}$	$\sqrt{}$	3	2	5	
Fantino E.		$\sqrt{}$	$\sqrt{}$	$\sqrt{}$		5	0	5	
Holborn S. W.			$\sqrt{}$		$\sqrt{}$	2	3	5	
Kelly T. H.				$\sqrt{}$	$\sqrt{}$	4	1	5	
Lee V. L.				$\sqrt{}$	$\sqrt{}$	2	3	5	
McDowell J. J.				$\sqrt{}$	$\sqrt{}$	5	0	5	
Roche B.			V		√	2	3	5	

Table 4

Most prolific EAHB authors in each of the research content areas, and number of articles published in JEAB and TPR combined during the 1980s, the 1990s, and the overall census period.

tne overali census period	10a.														
Behavioral				Stimulus				Reinforcement				Social &			
<u>Pharmacology</u>	80s	90s	M	Control	80s	90s	Ø	& Punishment	80s	90s	$\bowtie$	Verbal Behavior	80s	90s	$\bowtie$
Bickel W.K.	2	∞	10	Barnes-Holmes D.		19	19	Buskist W.F.	10	3	13	Cherek D.R.		∞	∞
Higgins S.T.	3	2	<b>∞</b>	Fields L.	1	16	17	Cherek D.R.		10	10	Critchfield T.S.		<b>∞</b>	∞
Griffiths R.R.	3	လ	9	McIlvane W.J.	9	9	12	Bennett R.H.	5	လ	∞	Buskist W.F.	4	လ	7
DeGrandpre R.J.		4	4	Adams B.J.		11	11	Barnes-Holmes D.	1	9	7	Barnes-Holmes D.		9	9
Foltin R.W.		4	4	Critchfield T.S.		11	11	Crosbie J.		7	7	Catania A.C.	4		4
Kelly T.H.		လ	3	Dube W.V.	4	7	11	Higgins S.T.	လ	4	7	Chase P.N.	7	2	4
Bennett R.H.		7	7	Smeets P.M.	7	<b>∞</b>	10	Bickel W.K.	1	5	9	Dougherty D.M.		4	4
Cherek D.R.		2	3	Hayes S.C.	4	2	6	Dougherty D.M.		5	5	Hayes L.J.	1	3	4
Rush C.R.		7	3	Hayes L.J.	7	5	7	Catania A.C.	4		4	Hayes S.C.	4		4
Silverman K.		7	3	Sidman M.	5	7	7	DeGrandpre R.		4	4	Matthews B.A.	4		4
				Saunders K.J.	3	4	7	Fantino E.	7	7	4	Shimoff E.	4		4
Choice &				Saunders R.R.	7	5	7	Johnston J.M	လ	_	4	Spiga R.		4	4
Preference	80s	90s	$\square$	Stromer R.	7	4	9	Lowe C.F	3	_	4	Bernstein D.J.		3	3
Logue A.W.	2	7	4	Dougher M.J.		5	5	Matthews B.A.	4		4	Hake D.	8		3
Navarick D.L.	2	2	4	Perone M.	2	3	5	McDowell J.J.	4		4	Joyce J.H.	1	2	3
Flora S.R.		3	က	Roche B.		5	5	Ninness H.A.C.		4	4	Kelly T.H.		3	3
Hackenberg T.D.		3	3	Stoddard L.T.	4	1	5	Perone M.	7	2	4	Ninness H.A.C.		3	3
Madden G.J.		3	3	Wulfert E.	1	4	5	Shimoff E.	4		4	Rosenfarb I.	2	1	3
Bickel W.K.		2	3	Baron A.	3	_	4	Spiga R.		4	4	Schmitt D.R.	1	2	3
Buskist W.F.	3		3	Bickel W.K.	1	3	4	Wearden J.	_	3	4	Bentall R.P.	1	_	7
Darcheville J.C.		7	7	Dymond S.		4	4	Zeiler M.D.	3	1	4	Cerutti D.T.	0	7	7
DeGrandpre R.J.		7	7	Fantino E.	7	7	4	Baron A.	3		က	DeGrandpre R.J.	0	2	7
Leung J.P.	1	1	3	Galizio M.	1	3	4	Bentall R.P.	3		3	Foltin R.W.	0	2	7
McDowell J.J.	1	_	3	Griffiths R.R.	_	3	4	Case D.	7	1	3	Lane S.D.	0	7	7
Rachlin H.	1	_	3	Lane S.D.		4	4	Flora S.R.		3	3	Martinez H.	0	7	3
Silberberg A.	1	1	3	Lazar R.M.	2	7	4	Hackenberg T.		3	3	Michael R.L.	0	2	7
Sonuga-Barke E.		7	7					Hayes S.C.	လ		က	Roche B.	0	7	7
								Joyce J.H.	1	7	က	Schmid T.	7	0	7
								Lee V.L.		လ	က	Torgrud L.J.	0	7	7
								Madden G.J.		3	က	Vyse S.A.	0	7	7
								Morgan D.L.	~ 0	Η,	က	Wulfert E.	1	-	7
								Navarick D.	~	_	.v				

Control, Reinforcement and Punishment, and Social and Verbal Behavior were addressed more often than Behavioral Pharmacology or Choice and Preference (left panel). The right panel of Figure 2 shows the primary topical emphasis of the most prolific authors, defined as the content category in which each author was most often represented. Consistent with historical trends in EAHB topical coverage, Stimulus Control and Reinforcement and Punishment were the most common major emphases. Interestingly, Social Verbal Behavior. although frequently addressed in EAHB articles was the primary emphasis for only 2 of the 42 most frequent contributors, suggesting that social and verbal processes are often a tangential consideration in contemporary EAHB research (e.g., Critchfield, Tucker, & Vuchinich, 1998). Choice and Preference was the area of primary emphasis for none of the 42 most prolific authors.

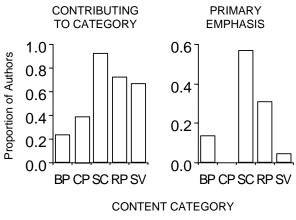


Figure 2

To evaluate content-area specialization more precisely, the most prolific authors, operationally defined as those with the most articles in a content category in JEAB and TPR during the census period, including at least one first-author publication, in each of five content areas, were determined. Table 4 lists approximately the 25 most prolific authors per content area (less for low-frequency content areas, more in the case of ties). Table 5 provides an estimate of the extent to which these authors have been specialized in their interests. The table shows the probability of an author in one content area also contributing to the other content areas. Several patterns are evident. First, the proportions shown in Table 5 all exceed the base rate with which the content categories were represented in the sample of articles. This

outcome is not surprising given that the authors involved, by definition, contributed more often than the typical author. Nevertheless, the base rates serve as a reminder that the content areas were addressed unequally in the sample of articles, and thus serve as a useful point of comparison for the other data in the table. Second. the most prolific authors in Behavioral Pharmacology exhibited a remarkable range in topical emphasis, with at least four-fifths of these authors contributing to each of the other four content areas. This may be a characteristic of human Behavioral Pharmacology, which, in the abstract, considers drugs in the context of the major operant phenomena (Higgins & Hughes, 1998), or it may simply reflect the interests of the relatively few authors involved in our sample (Table 2). Third, authors with a Stimulus Control emphasis tended to contribute least frequently to each of the other four categories than colleagues with other topical emphases. But whether the apparent specialization of Stimulus Control researchers reflects a worrisome narrowness, or a valuable focusing of perspective in a rapidly maturing research area, cannot be ascertained from the data.

Table 5
Proportion of the most prolific EAHB authors in each content area that also contributed to other content areas.

Author's	Othe	Other Content Areas of Contribution							
Content Area	BP	CP	SC	RP	SV				
BP		.80	.80	.80	1.00				
CP	.14		.43	.71	.39				
SC	.15	.27		.53	.58				
RP	.25	.50	.59		.75				
SV	.27	.27	.87	.73					

# **CONCLUSIONS**

Overall, the present data suggest that the EAHB benefits from a moderate but steady infusion of new talent which is balanced by the contributions of veteran investigators. Whether the next generation of investigators can sustain the field's momentum of the past twenty years remains to be seen. There is cause for optimism, however, in the observation that several of the most prolific authors in each of the five content areas examined contributed exclusively in the 1990s.

The present findings mirror those of Critchfield et al. (2000) and Dymond and

Critchfield (2001, 2002) to the extent that over the past two decades research in Stimulus Control has supplanted that of other areas. To evaluate whether or not this represents a threat to the diversity of the EAHB, consider the following points. First, the increase in attention to Stimulus Control appears to be at the detriment of research on Choice and Preference and Behavioral Pharmacology. While the appearance of Choice and Preference studies with humans in JEAB and TPR may have already peaked, at least using existing preparations, research on human Behavioral Pharmacology is regularly published in mainstream psychopharmacology journals. This suggests a wider audience for both Behavioral Pharmacology and the EAHB discipline than is revealed by the present analysis. For instance, journals such as Pharmacology, Biochemistry and Behavior, Learning and Motivation, the Journal of Experimental Child Psychology, the Quarterly Journal of Experimental Psychology, the American Journal on Mental Retardation, and Brain Injury, among others have contained EAHB publications in recent years. While trends such as these bode well for the field in general, additional factors such as the pressure on faculty to publish highquality articles in high-impact journals (see Garfield, 1989), suggest that EAHB research may have to continue broadening its publication base.

Second, practical considerations and the relative ease of conducting research on Stimulus Control topics may partly explain content trends. As others have noted, stimulus control studies often require subjects to participate for only a few hours compared to the parametric and otherwise complex designs often employed in research on require choice that often the extended participation of individual subjects (Schmitt, 1995). Similarly, a range of readily available experimental software (e.g., Dube, 1991; Roche, Stewart, & Barnes-Holmes, 1999) and replicable experimental procedures now make it possible for isolated researchers to initiate and maintain a research program with few resources.

Third, the continued growth in Stimulus Control research reflects recent theoretical and empirical developments in the analysis of human verbal behavior. For many researchers, the generative, bidirectional nature of derived stimulus relations provides an empirical approach to, and working model of, verbal behavior itself (e.g., Hayes, Barnes-Holmes, & Roche, 2001). Given that understanding the complexity of human behavior directly has been the objective of

behavior analysis from the outset, it is perhaps not surprising that human verbal behavior is now the subject of such research attention. Indeed, the experimental analyses of complex behavior such as cognition, emotion, and rule-following are still being developed and are being aided by the explanatory power of derived stimulus relations and the array of unique preparations now available to study human behavior directly. It seems, then, that research on derived stimulus relations is set to be a predominant feature of future publication trends. Finally, as theoretical and empirical advances continue areas such as stimulus control may command more funding opportunities and attract more graduate students and hence potentially more EAHB publications than other areas.

In conclusion, almost twenty years ago, Miller (1983) speculated on the factors behind a small human operant data base and asked whether the EAHB was "just dormant or ... in the final abortive phases of demise" (p. 552). The present report, as well as other surveys of publication trends that are now available, clearly show that the EAHB is far from in demise. In fact, it continues to grow at a healthy and steady rate into a distinct, viable sub-discipline directly addressing the complexity of human behavior.

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