Invented Spelling in Adults: More Data*

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After learning the English alphabet, a very few children, perhaps 10% or less,[1] "spontaneously" begin to create their own "invented spellings." Children who participate in invented spelling activity are faced with the task of providing representations of approximately 40 phonemic sounds (depending upon the dialect of English under consideration) with only 26 letters of the alphabet. Hence, it is hardly surprising that children use certain unusual strategies to achieve their goals. Furthermore, while these children know the names of the graphic symbols in the alphabet, they lack specific knowledge about the sound-to-letter correspondence in the English alphabetic system. For example, children do not know that the single letter *A* may represent the sound /a/, the sound /æ/, or the sound /ey/.[2]

According to Carol Chomsky, these children use a very consistent set of strategies, all of which taken together seem to suggest "a fairly sophisticated form of linguistic abstraction." (1976:4) Chomsky (ibid) gives a more complete list of strategies which she has recorded, but I want to limit the scope of the discussion to follow to the four characteristics listed below (see also Paul 1976; Read 1971, 1973):

(1) "Letter name spelling" (LNS): This strategy is characterized by the use of a single letter to represent a full syllable (either Vowel-(optional) Glide, Consonant-Vowel, or Vowel-Consonant), e.g., LADE 'lady,' U 'you,' R 'are,' NHR 'nature,' etc.

(2) "Affricate segmentation" (AS): The representation of a fricative sound with a homorganic affricate, e.g., FEH 'fish,' HE 'she,' etc.

(3) "Diphthong segmentation" (DS): The representation of a lax vowel with the nearest tense diphthongal vowel in terms of place of articulation, e.g., FEH 'fish,' BAT 'bet,' etc.

(4) "Non-recoverability" (NR): This characteristic is reflected by identical spellings for different words which often appear, e.g., 'beat,' 'bet,' and 'bat' could all be spelled BET, depending on the strategy used.

One might speculate concerning the nature of invented spelling ability (or even spelling ability, in general), with the idea in mind

that some deeper implications are apparent. For instance, spelling ability might reflect certain cognitive-developmental characteristics. If this is, in fact, true, then one might expect some quite noticeable differences between the way in which children approach the task and the way in which adults do so (when placed in situations designed to mimic the child's situation when invented spelling occurs), as reflected, say, in the responses of each group. For instance, it might be expected that adults would be particularly sensitive to the "recoverability" criterion mentioned above,[3] perhaps resulting in the development of some highly idiosyncratic spelling strategies.

Alternatively, one might suggest that there will be little, if any, difference between children's and adults' spellings and thus infer that there is a basic organizational ability operating which does not change appreciably in the course of cognitive maturation. Assuming that this is correct, then one must predict that adults will exhibit the same strategies that children utilize when participating in invented spelling activity.

These notions can be confirmed or disconfirmed by devising an experimental task for adults which duplicates the situation faced by children who are attempting to write. Following O'Grady and Gibbons (1980b), such a situation was created (a) by using graphic symbols which were unknown to the adults participating in the experiment and (b) by designing the list of test words such that the number of (phonemic) sounds in the letter names supplied with the graphic symbols was insufficient to represent each test word accurately and uniquely.

In an attempt to make the situation somewhat similar to the task faced by children learning their orthography, each of the words to be spelled had a "meaning" learned by the subjects prior to the spelling task. The experiment also included a subpart which introduced morphophonemic alternation (in the form of a plural counterpart for each token).

I frankly admit that these two aspects may not produce desirable results. As O'Grady (personal communication) points out, these strategies may considerably complicate the tasks for the participants in the experiment and, in fact, may not make the tasks any more like those which children face in spontaneous invented spelling activity. That is, young children would almost certainly have a command of the use of the English plural morpheme, while it is unlikely that the subjects here will have comparable knowledge of the plural morpheme utilized in the experiment. I will assume, however, that the inclusion of these additional factors will not unduly alter the results.

Method

Subjects

Eleven psychology graduate students served as subjects, six males and five females. Four of these had had an introductory course in linguistics. One male subject was subsequently dropped from the analysis due to failure to follow instructions.

Procedure

The participants attended five sessions of approximately one hour each and were paid $10 for their participation in the experiment. In addition, one brief (½ hour) follow-up session occurred one week later. The tasks for each day of the experiment are described below.

Day 1: Sixteen nonsense words—/suč/, /čab/, /ǰubis/, /sʌwč/, /risay/, /suǰ/, /ǰas/, /ušmu/, /ǰuč/, /ǰayb/, /rʌǰ/, /mub/, /ǰas/, /sʌw/, /ras/, and /šaym/—were presented, only aurally, for subjects to learn. Emphasis was placed on the correct pronunciation of the words and the subjects were instructed not to use any written cues to aid them in remembering the words. They were, however, encouraged to practice rote repetition of the words at home. Each of the sixteen tokens represented the name of a physical object; a pictorial representation of this "meaning" was presented along with each word.

A "plural" representation was also presented for each word, yielding a total of 32 learned words. Plurals consisted of three variants of a single morpheme to indicate the plural form of the word. The choice of allomorph was fixed and depended on an entirely rule-governed alternation (in a linguistic sense). The allomorphs and the linguistic rule were:

Allomorphs: [-ʌč], [-ʌǰ], and [-ǰ]

Plural formation: $^{\circ}/\text{-}\Lambda j^{\circ}/ \longrightarrow \begin{Bmatrix} [\text{-}\Lambda\check{c}] & /[\text{-voice}] + \_\_\_ \\ [\text{-}\check{j}\ ] & /[\text{+syll}\ ] + \_\_\_ \end{Bmatrix}$

where '+' equals 'morpheme boundary.'

Day 2: The thirty-two words were reviewed with the repeated caution that no written cues were to be used to aid in remembering the tokens.

Day 3: The thirty-two words were further reviewed to ensure accuracy of recall.

Day 4: Each participant was tested individually. Subjects were asked to repeat the thirty-two nonsense words in response to the

presentation of the visual cues. Then, a test list consisting of ten novel words—/yumi/, /rus/, /sar/, /čʌb/, /bʌč/, /bruǰ/, /yas/, /sum/, /mray/, and /ǰač/—was presented. Each subject was asked to repeat the singular form and then produce the plural forms (i.e., /yumi-ʒ/, /rus-ʌč/, /sar-ʌǰ/, /čʌb-ʌǰ/, /bʌč-ʌč/, /bruǰ-ʌǰ/, /yas-ʌč/, /sum-ʌǰ/, /mray-ǰ/, and /ǰač-ʌč/, respectively. The oral responses of each subject were recorded on audio tape for later analysis. The subjects were also questioned concerning their strategies in performing the task.

Following this individual testing, the participants (as a group) were taught the set of nine orthographic symbols of the imaginary language. The symbols which were used for the alphabet, including their phonetic letter names were /ri/ — И, /sa/ — Ф, /če/ — Л, /yuw/ — Б, /ʌw/ — Д, /ay/ — Г, /ub/ — Ю, /ma/ — Ж, and /ǰu/ — Ш. This "language" consisted of 14 phonemic sounds (which were to be represented with the 9 symbols in the alphabet). Again, the subjects were requested not to use any written cues to help them learn the alphabet.

Day 5: A brief review of the alphabet preceded the test session. The twenty-six nonsense words were presented in a random order to the subjects and they were requested to write down as best they could the singular and plural forms using the graphic symbols which they had been taught. They were further instructed not to alter the symbols in any way. Any other strategy at all was allowed (e.g., doubled symbols, etc.).

Follow-up: Exactly one week after the Day 5 procedure, each participant was visited individually. They were asked (1) what types of strategies had been developed during the spelling portion of the experiment and (2) to attempt to read back the spellings they had written. Each session was recorded on audio tape for later analysis.

Results and Discussion

The results of the alternation task (Day 4, above) appear in Table 1, with accompanying graphic in Figure 1. It is noteworthy that all subjects performed better than chance (and most of them considerably better) on this task. The correlation between performance on the initial list and performance on the test list was reasonably high ($r = 0.65, p < 0.05$).

Table 1

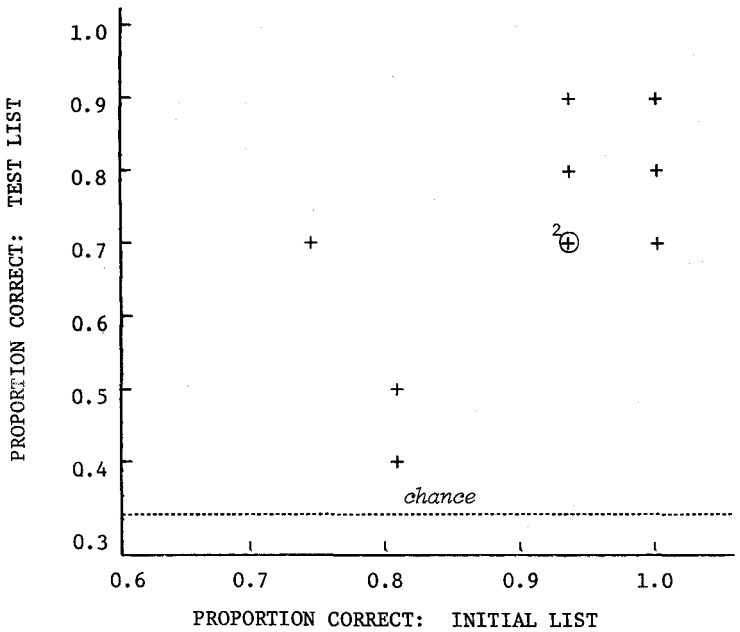
Alternation Task Performance

SUBJECTS	PROPORTION CORRECT FOR INITIAL LIST*	PROPORTION CORRECT FOR TEST LIST**
DS	0.94	0.90
HD	0.81	0.50
LB	0.75	0.70
GP	1.00	0.70
DP	0.94	0.70
ES	1.00	0.90
KM	1.00	0.80
BB	0.81	0.40
TF	0.94	0.70
DS'	0.94	0.80

*n = 16 items
**n = 10 items

Figure 1

Alternation Task Performance



In many respects, the adults' invented spelling data show use of the same strategies that children use when attempting to write their language. In particular, the LNS was extensively used. This result supports the results of O'Grady and Gibbons (1980a), but as will be clear, the data reflect a high degree of complexity with regard to choices of strategies other than LNS and interactions between interdependent strategies. The percentages of those strategies used (out of the total possible uses) by participants are listed in Table 2. There are several points to be made here:

Table 2

Percentages of Strategies Used by Participants to Possible Uses

	Subjects										
	DS	HD	LB	GP	DP	ES	KM	BB	TF	DS'	Mean
	Letter Name Spelling										
	100	91.7	100	83.3	91.7	83.3	100	83.3	83.3	91.7	89.4
	Affricate Segmentation										
1	100	50	100	0	50	0	0	0	100	100	45.5
2	0	50	0	0	50	100	0	50	0	0	27.3
3	0	0	0	100	0	0	100	50	0	0	22.7
	Diphthong Segmentation										
4	33.3	0	33.3	0	33.3	33.3	100	0	0	33.3	27.3
5	0	0	0	0	4.8	0	0	4.8	0	0	0.9
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	38.1	0	9.5	0	38.1	19.1	10.0
8	28.6	0	42.9	100	42.9	57.1	85.7	0	57.1	71.4	45.5
9	0	14.3	14.3	0	0	0	0	0	0	0	2.6
	Interference Phenomena										
10	0	0	0	100	0	0	100	50	0	0	22.7
11	33.3	66.7	33.3	66.7	33.3	0	0	66.7	100	33.3	39.4
12	95.3	85.7	19.1	100	4.8	0	47.6	9.5	23.8	4.8	37.7
	Other Strategies										
13	0	28.6	0	14.3	14.3	0	0	42.9	14.3	0	10.4
14	45.5	36.4	54.6	45.5	9.1	36.4	63.6	27.3	45.5	72.7	43.0
15	0	27.3	9.1	9.1	45.5	0	9.1	9.1	0	0	10.8
16	18.2	0	0	36.4	9.1	27.3	0	27.3	9.1	0	12.4
17	0	0	0	0	8.3	0	0	16.7	0	0	2.3
18	16.7	0	0	0	0	0	0	8.3	0	0	2.3

Table 2 (continued)

Key to Strategies Used

1	Л	(/če/) to represent /š/
2	Ф	(/sa/) to represent /š/
3	ФЛ	(/sa-če/) to represent /š/
4	Д	(/ʌw/) to represent /ʌ/ — singular
5	Д	(/ʌw/) to represent /ʌ/ — plural
6	Г	(/ay/) to represent /ʌ/ — singular
7	Г	(/ay/) to represent /ʌ/ — plural
8	Д	(/ʌw/) to represent /a/
9	Г	(/ay/) to represent /a/
10	ФЛ	(/sa-če/) to represent /š/
11	Б	(/yu/) to represent /ʌ/ — singular
12	Б	(/yu/) to represent /ʌ/ — plural
13	Б	(/yu/) to represent /a/
14	Б	(/yu/) to represent /u/
15	Д	(/ʌw/) to represent /u/
16	Ю	(/ub/) to represent /u/
17	Ю	(/ub/) to represent /ʌ/, /ʌw/, or /a/
18	Ф	(/sa/) to represent /ʌ/, /ʌw/, or /a/

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(1) LNS is overwhelmingly chosen when it is possible to do so; (2) AS and DS are considerably less salient, in particular (a) regarding AS, the use of Л (/če/) to represent /š/ is not significantly different from either of the other two possible representations of /š/ (i.e., (/sa/) alone or a sequence of ФЛ (i.e., /sa-če/)[4] (in the first case $t(18) = 1.342$, $p > 0.05$ and in the second case, $t(18) = 1.246$, $p > 0.05$; and (b) the DS figures show a great amount of variability with no strategy being chosen to the exclusion of any other.[5] Hence, it would seem that O'Grady and Gibbons' conclusion which suggests that adults utilize these two strategies far more than any other possible strategies is somewhat premature. The direct comparisons between figures which O'Grady and Gibbons (1980c) report and those presented here appear in Table 3.

Table 3

Comparison of O'Grady and Gibbons (1980c) to the Results of This Study

		O'Grady and Gibbons	This Study
LNS		81 %	89.4%
AS		78.5	68.2
DS	1.	47.5	14.1
	2.	54	24.1

where, 1 is Д (/ʌw/) to represent /ʌ/
and 2 is Д to represent /a/

One occurrence which stands out (like a "sore thumb") is the drastic differences between singular and plural forms where some representation for /ʌ/ is required. Although segmentation of Д (i.e., /ʌw/) to represent either /ʌ/ or /a/ was fairly common on the whole, the variation with regard to when this was done is striking. I have no reasoned explanation to offer in this regard.

Finally, the results of the one week follow-up in which subjects were asked to read back the spellings that they had produced are presented in Table 4. The results here are also rather striking.

Table 4

Results of Attempt to Read Back Spellings

	Subjects										
	KM	DS'	GP	LB	ES	TF	DS	BB	DP	HD	Totals
/risay/	+	+	+	+	+	+	-	+	+	+	9
/mub/	+	+	+	+	+	+	+	+	+	-	9
/sʌw/	+	+	+	+	+	+	+	+	+	-	9
/ǰuč/	ø	+	+	+	-	+	+	+	+	+	8
/ušmu/	ø	+	+	+	-	+	+	+	+	+	8
/suč/	+	+	+	+	+	-	-	+	-	+	7
/ǰubis/	+	+	+	-	+	+	+	-	-	+	7
/ǰayb/	+	+	+	+	-	+	+	-	-	-	6
/mray/	+	+	-	-	+	+	-	+	+	-	6
/sum/	+	+	+	-	+	+	ø	+	-	-	6
/suǰ/	-	+	+	+	+	+	+	-	-	-	6

	KM	DS'	GP	LB	ES	TF	DS	BB	DP	HD	Totals
/bas/	-	+	-	+	+	+	+	-	+	Ø	6
/ǰas/	+	+	-	+	+	-	+	-	+	-	6
/sʌwč/	+	+	+	+	-	-	Ø	+	-	-	5
/čab/	+	-	+	+	+	+	Ø	-	Ø	-	5
/šaym/	+	-	+	+	+	+	Ø	-	-	-	5
/ras/	+	+	+	-	+	-	+	-	-	-	5
/sar/	+	+	-	+	-	Ø	-	-	-	+	4
/rʌǰ/	+	-	-	-	+	+	+	-	-	-	4
/yumi/	-	+	+	-	-	Ø	-	+	-	-	3
/bruǰ/	+	-	+	+	-	-	-	-	-	Ø	3
/čʌb/	+	-	-	-	-	-	-	-	+	-	2
/yas/	-	-	-	-	-	-	-	-	+	-	1
/rus/	+	-	-	-	-	Ø	-	-	-	-	1
/ǰač/	-	-	-	-	-	-	-	-	-	-	0
/bʌč/	-	-	-	-	-	Ø	-	-	-	-	0
Totals	18	17	16	15	14	14	11	10	10	6	131

+ : correct readback
- : incorrect readback
Ø : no response

Although one might suggest that some notion of long-term memory is relevant, it seems clear that this is not all that is going on here.[6] I return to this question below.

General Discussion

It would seem that O'Grady and Gibbons' conclusion that "the basic graphic competence underlying early spelling activity in children remains essentially unchanged in adults" is perhaps too strong. No actual figures for children's invented spelling activity are available at present, however; thus, any such conclusions which involve adult-child comparisons are not, in reality, possible. Even assuming that figures from children for LNS, AS, and DS are high (i.e., greater than 90%), only LNS in adults corresponds well.

There are other aspects of these results which are of some interest though. In particular, it is interesting to note that the participants in this experiment attempted to spell what they heard phonetically rather than morphophonemically. That is, rather than choosing a single letter to spell the plural (as it is in English), these subjects chose either Л (/če/) or Ш (/ǰu/) depending on how it sounded. Hence, it is clear that whatever morphological information was acquired, it was not manifested in the spelling task. It appears that only phonetic considerations played a role in the performance on the spelling task.

The overwhelming choice of LNS whenever it was possible suggests that syllabic writing systems are more salient than alphabetic systems. Further support for this view comes from the very low incidence of spelling disfunctions and difficulties in Japan.[7]

The ambiguous figures which were obtained on the DS and AS strategies strongly suggest that these are not salient features for adults' invented spelling. In fact, the choice of Д (/ʌw/) to spell either the /ʌ/ or /a/ sound may have been necessitated by a lack of any other appropriate letter in the set. Likewise with the representation of /š/: no other letters aside from Ф (/sa/) or Л (/če/) were at all appropriate. The obvious limitations of an experiment of this sort are apparent.

Finally, with regard to the non-recoverability of the spellings, it would appear that they are, in fact, partially recoverable. What is interesting, however, is the comparison of "most recoverable words" to "least recoverable words." By dividing the scale in Table 4 at the "5-recalled"/"4-recalled" boundary and calculating simple proportions of tokens which contain "pure" (non-diphthongal) /ʌ/ or /a/ in each set, we find that in the group of five-or-better-recalled this proportion is 0.24, while in the group of four-or-less-recalled this porportion is 0.67. I would suggest that this is indeed more a function of the symbols and words which were used than one involving the "basic spelling competence" of these subjects; however, it is certainly a problem which requires further investigation.

The single assertion that reflects the results obtained here is succinctly stated in O'Grady and Gibbons as follows: "the evidence would seem to indicate that the characteristic properties of preliterate invented spelling are more probably due to the limited resources provided by the graphic system itself than to the cognitive and linguistic immaturity of the pre-school child." (1980a:10) The fact that adult behaviour and child behaviour are similar in some respects (despite the dissimilarity of the situations) suggests that there is some invariant cognitive component available to both groups. O'Grady and Gibbons term this component "graphic competence" (1980b:6). Considerably more research in this area is required before we can reach robust conclusions, but my feeling is that this common component plays a relatively small role in the activities discussed here.

Footnotes

*I would like to thank W. J. Baker, D. G. Jamieson, and W. D. O'Grady for offering comments on previous versions of this paper. In addition, Meg Cheeseman and Don Jamieson provided invaluable assistance (this word is ambiguous) in the execution of the experiment.

[1]Although I suggest 10%, the number is not known. I believe this to be a reasonable "ballpark" estimate, however, particularly when one thinks of the number of linguistic groups that have developed no writing system.

[2]I will use capital letters for spelling representations and phonemic transcriptions for sound representations.

[3]This with reference to Piaget's "pre-operational" versus "formal-operational" stages of thought (Piaget 1964).

[4]Note that Л Ф (i.e. /če-sa/) was never used to represent /š/. Hence, the "chance" proportion of 0.33 (note that this does not assume random representation of sounds). Furthermore, if the figures for both representations which utilize Л are pooled (as O'Grady and Gibbons did), the figure is comparable to theirs, i.e., 68.2% in this study, 78.5% in their study.

[5]O'Grady (personal communication) suggests that this variability may be a result of complications relating to the "morphological knowledge" that the participants may have been trying to manipulate simultaneously. Although this is possible, the indications from follow-up questions concerning the strategies that were used in performing the tasks would not support this interpretation.

[6]Many of the subjects reported that they were recalling the actual nonsense words after poring over the spellings, rather than actually "reading" their spellings. The full analysis of the reports from the subjects concerning the techniques they used in the tasks is not yet complete, in anticipation of a more comprehensive report at a later date.

[7]This information comes from a lecture by D. T. Hakes at The University of Calgary in April of 1979.

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