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REPORTS

Questionnaire on CAP

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A STUDY OF AUDITORY PROCESSING IN CHILDREN: CATEGORIZING AP RESULTS PART II

Jack Katz, Paula S. Smith, Barbara Kurpita and Susan Brandner

ABSTRACT

This is the continuation of an article from the February 1992 issue. It is based on a study of 120 children (mean age = 8.1 years) who were seen for AP evaluations primarily at three facilities in the US and Canada. In addition to the use of standard scoring procedures, the audiologists carefully reported Qualifiers and classified the SSW, Phonemic Synthesis and speech-in-noise results according to a four AP category system (Katz, 1992).

Part II provides additional test results and offers some insights. It includes AP test scores for the 5 groups and an introduction to Qualifiers. Subject groups are based on the "primary" AP test findings as determined by two independent researchers. When there was disagreement a third researcher was called in. The groups are Decoding (DEC), Tolerance-Fading Memory (TFM), Integration (INT), Organization (ORG) and Other (OTH).

PERFORMANCE ON CENTRAL TESTS

C-SSW Results

Table 1 shows the AP results based the S's primary category of dysfunction (e.g., TFM). Comparing C-SSW means for normal 8-year-olds (i.e., 1,6,10,0; re C-NS-85): 1) each group's mean is poorer for the LC Condition and 2) the DEC group mean is poorer than the normals for each Condition. 3) Mean LC scores (except for the ORG group) are even poorer than the normal limits for control subjects and this is generally true for the RC Conditions as well. 4) All of the ORG group means fall within the normal limits.

The number of reversals for each group is greater than mean number for normals. Only the ORG mean was poorer than normal limits for 8-year-olds (i.e., 4). Of course this is no surprise because the ORG category is based on significant SSW and/or PS reversals. It is only the large mean number of reversals that is worthy of note. The Other (OTH) group, although similar to the ORG group in the mildness of their language problems, differs markedly in the number of reversals. The OTH group did not have a significant number of reversals.

	R-SSW				C-SSW					PS	SP-IN-N DIFF	
GROUP	RNC	RC	LC	LNC	RNC	RC	LC	LNC	REV	SCORE	RE	LE
DEC	8	24	34	9	2	18	27	2	3	14	36	36
TFM	5	18	30	6	0	12	24	0	3	18	38	44
INT	8	18	40	10	1	11	31	1	3	13	34	36
ORG	4	10	18	5	-3	2	12	-2	16	19	32	34
OTH	4	10	28	3	-4	3	22	-3	1	20	29	31

Table 1. Results of AP tests. Mean: SSW scores in percent of error, number of reversals, number correct on Phonemic Synthesis (PS) test and difference scores for the speech-in-noise test.

Soon after we began studying CAP categories we realized that poor decoders generally had significant RC scores. Although, the RC score was one of several criteria that we used to assign subjects to this category, we were impressed that for R-SSW the RC score was 6 points higher for the DECs than for the next poorest group. The LNC condition was also poor for this group. The difference between the R-SSW and C-SSW scores gives one pause whether in normal hearing CAP cases that we are not better off using the raw score. This R-SSW, C-SSW difference reminds us that if a child has a spuriously poor WDS it can reduce the significance of an apparent CAP problem. We shall take a look at this potential problem.

Phonemic Synthesis (PS) and Speech-in-Noise (S-N) Results

Normal limit for 8-year-olds on the PS test is 17 correct. By this criterion the DEC and INT groups had major phonemic difficulty with scores of only 14 and 13, respectively. These results were expected because both DEC and Type-1 INT groups are thought to have important phonemic problems.

Based on our S-N norms (i.e., 21-35% error= MI, 36-50= MO), 1) the Tolerance-Fading Memory (TFM) group had the poorest means (falling in the mid-moderate range). This was expected because a) the TFM group tends to fall sharply in their speech understanding in noise, and of course b) the S-N score was an important criterion in deciding on the TFM category label.

2) The DEC group had the next poorest S-N scores, but had similar means in each ear (TFM cases were a bit poorer in the LE than RE). 3) For the INT group, although the ears were similar only the LE was in the moderate range (also the TFM and INT groups have much poorer LC than RC performance). 4) The means for the ORG and the OTH groups fell within the mild range on the S-N test. Thus they have milder CAP scores as well as better language (especially receptive) and reading scores (see Part I).

Qualifiers - A Closer Look

The old standbys of the SSW, the 4 Conditions and the various Response Biases, have been in use for 30 years. We know how to calculate them and to what they relate, because over the years the procedures have been broadly investigated and refined. Another advantage is that these signs were studied in adult brain damaged populations so that the effects were dramatic and specific. Also variables such as maturation and vocabulary were of relatively little consequence when studying these measures.

Recently, Qualifiers have been added to the diagnostic protocol. Qualifiers refer to behaviors which help to clarify or more precisely describe the patient's response to each item. Many years ago Bruce Porch set our profession on a course that encouraged us to look at the quality of test responses and not simply whether they were right or wrong. We feel that this approach has an important contribution to CAP testing as well.

For one thing Qualifiers reflect "work samples". They are more than just responses to test items, they shed light on how people deal with listening tasks, given their various strengths and weaknesses. If it is a difficult task for the person (e.g., one that compels the individual to take additional time to analyze the sounds of a word) then we can anticipate a delayed response more so than a quick response (whether it is on an SSW item or in conversation). However, if the person has trouble with short term recall (i.e., a rapidly fading memory) then we can expect a quick/rushed, response rather than a delay.

As in the case of reversals, Qualifiers can provide information about the underlying processing even when the item is correct. In such a case it may tell what the person had to do to get the item right (e.g., take more time vs. rush the answer). In the case of a smush (e.g. "sea shout side" for "sea shore out side"),

we see a tendency to take parts of competing information and combine them. Such a person might be prone to mixing together material from different speakers or different sound sources in normal life situations. This is reminiscent of a client who could not work and listen to the radio because he thought the broadcast speech was said by his customers.

The present research project is the first one to look into the value of Qualifiers from a prospective view. That is, we were looking to see if these were useful indicators and if they were measuring what we thought they were. For this reason we took care to observe and properly note Qualifiers. Up until this time we studied the performance of cases in our files and from previous research. This provided us a completely unbiased view and enabled us to find the associations with communicative and learning problems. The present research is an attempt to cross validate the observations and to make better determinations regarding the clinical criteria.

In order to study the proper criteria for determining Qualifiers, we are developing a computer program to aid us. This has taken more time than expected (if you have worked with computers to simplify and speed up your work, you probably understand our delay). The results of our findings will be reported soon as Part III of this series.

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CAP QUESTIONNAIRE: WHAT THE PROFESSORS THINK

Jack Katz

ABSTRACT

A 54% CAP questionnaire return rate was obtained from personnel at 5 universities. The attitudes of Sp-Lang Pathologists, Audiologists and Others were sampled and analyzed separately for students and professors.

BACKGROUND

One of the main problems that we face in the area of CAP is the confusions and attitudes that abound. While I do not want to make this into a political statement, I would liken the situation to that of Dan Quayle. Any contribution or good idea that he has had is ignored because we have become accustomed not to take him seriously.

While CAP is not running for vice-president of the United States, many people feel comfortable in ignoring it or giving it short shrift because for so long there have been loud detractors poking fun at it. Arguments to the contrary are responded to patronizingly with "there you go again with that CAP stuff, come on catch up with the modern world".

The people who stand the most to learn from us and the most to teach us are generally the ones who are least willing to enter into a dialogue. You may have heard me say that, "You don't know what you don't know, until you know it". This was the motivation behind the questionnaire, to find out what agreements and disagreements people have with various CAP ideas. What can we learn (in areas in which <u>they</u> have valid questions and concerns) and where do they stand to learn (in areas that we can share our knowledge and points of view)?

SUBJECT SAMPLE

Five state universities from different geographical regions were chosen to participate in this study. Three of the schools were in the mid-west (north, central and south) and one each was in the east and west. They were chosen because I knew a colleague at these universities who would help "get out the votes". Three of these contact people were audiologists and 2 were speech-language pathologists or speech-scientists. It is interesting that the two programs that had SLP contact people had more SLP returns and from the schools with audiology contact people we had more audiologists responding.

In all, 136 questionnaires were sent out with addressed and stamped envelopes (to encourage people regardless of their attitudes and ability to pay for postage to respond). Seventy-three filled-out questionnaires were returned (54%). This was a good return, as questionnaires go (especially without follow up contact). It is likely that having a local contact person made the project more important to the potential subjects.

In June 1991 the contact people were to put the questionnaires in the mail boxes of teaching faculty and Ph.D. students (the faculty of the near future). The responses are shown below by category:

AUDIOLOGY		SLP		OTHER	
STU-DENT	FAC-ULTY	STU-DENT	FAC-ULTY	STU-DENT	FAC-ULTY
84%	64%	43%	56%	20%	39%

Sixteen out of 19 audiology students responded yielding the highest return rate, followed by audiology faculty members (14/22). We were not surprised that audiology had the biggest percentage of return (73%), followed by SLP (49%) and then Other (speech scientists for the most part) (35%). However, it should be noted that because of the greater numbers of SLPs receiving questionnaires that they had a greater weight than audiology in the returns (35 people vs. 30).

The percentage of return seems to reflect the interest level of the group. Based on this trend it is logical to assume that those who are most distressed by CAP are least likely to have responded. We found a better return rate from audiology students than audiology faculty. Let's hope that's a good omen.

RESULTS

Overall, the Audiologists (AUD) tended to view CAP more favorably than the SLP, but on many questions the results were quite similar (see Fig. 1).

The responses reported here were on a scale of 1 (strongly agree) to 7 (strongly disagree). The first question asked if the S believes that the acoustic signal (speech) carries little information. About half of the group strongly disagreed, while 2 people agreed mildly. Responses of AUD and Other (OTH) Ss (mean= 6.5 for each) were more negative to this statement than those in SLP (m= 5.8). Considering that AUD is more involved with the acoustic signal than SLP, it is not a surprising find. It was a good sign that the two groups did not differ by more.

The second question was to get at the same notion, listeners need only a good cognitive system to understand. The results were similar to the previous question, but all three groups were a bit more inclined to agree (AUD 6, OTH and SLP about 5). The remaining question in which the groups differed considerably was #24 asking whether the person would consider the use of an FM unit for a child who couldn't understand in a noisy class. *The results for this question are transposed for easier comparison with the two previous items.* AUD were most supportive of the use of FM systems (with a 1.9 rating) followed by OTH (2.8) and SLP (3.0).

It is interesting to note that the SLP and OTH Ss were somewhat favorably inclined to the use of an assistive listening device (ALD) (SLP 2.8 and OTH 2.1), but were much more favorable toward preferential seating (also expressed in the affirmative for comparison to the above, SLP 0.8 and OTH 2.0). AUD were quite favorable about both methods (expressed favorably ALD was 1.8 and preferential seating 0.4). From the standpoint of starting a dialogue, the average SLP and AUD were not very far apart on the point of preferential seating.

The AUD in this study indicated more experience in evaluating CAP than the SLP, but there was no difference in experience with remediation. This reflects the general observation that audiologists are more likely to

evaluate the problem and SLP are more likely to remediate the problem. In this case the audiologists were more involved with remediation than the general impression. Perhaps the involvement of audiologists in remediation is a more recent development.

The data were analyzed in another way. It is somewhat artificial to divide up into professional groups because within those groups there is so much heterogeneity. Therefore the data were divided up based on the person's stated attitude regarding the importance of phonemic information. Three groups were formed based on the responses to the first 2 questions. Those strongly opposed to the notion that the phoneme carries little information (responding with 6 or 7) were placed in the High (H) group (n=44), those whose lowest score was 5 (for one or both questions) were considered mildly opposed and thus were placed in the Middle (M) group (n=19) and the remaining Ss with lowest ratings of 3 or 4 on the questions were considered the Low (L) group (n=10). This latter group had relatively little confidence in the acoustics of speech in deriving meaning.

The major differences between these groups were noted on 4 questions. (#6) Those who had lower estimations of the phoneme were also less inclined to believe that there is such a thing as CAP (H=6.2, M=5.7, L=4.6). (#18) The groups differed with regard to the statement that phonemic decoding is beyond the scope of audiology. H and M groups had means of 5 while the L group had 3.3 (slightly favoring the notion). It is interesting that L did not differ from the other two groups in feeling that phonemic decoding was within the province of SLP. Thus, the L Ss who are not excited about the importance of speech sounds feel that this work, when carried out, should be a function of the SLP and not the AUD. Perhaps this is a turf question. I am personally not upset about this, as long as someone is doing the work with those who need it. (#22) It is interesting that the L group was more likely than the other 2 to state that CAP testing should be limited to evoked potential measures. The means for the H and M groups were in the unfavorable range (H= 5.7, L= 5.6) while the mean for the L group was in the equivocal range (L= 4.2 with considerable variation among the subjects). (#24) The FM auditory trainer question was also different for these groups. H & M would consider using ALDs (H= 2.2, M= 2.3) while the L mean was in the equivocal range (L= 3.9) with much variation among Ss.

The questionnaire was quite successful in my opinion. It brought the question of CAP more to the fore, even for those who chose not to respond. Perhaps they had to ask themselves why they could discuss other issues but not this one. It was useful that 56% of the respondents indicated a strong lack of knowledge in CAP and many wondered why there wasn't more coverage of CAP in their curriculum.

The comments people made were extremely interesting. More than half communicated their insights, concerns and questions. Unfortunately, there is only room for two examples. 1) I most enjoyed a doctoral student who obviously did not know my passion for CAP. He said that from the way I wrote the questionnaire it was obvious to him that I was against CAP.

2) Another wrote, "This area has intrigued me for years. I tend to agree with people like Rees and Matkin & Hook who have written in this area that: 1) we still do not fully understand the construct of CAP; 2) it is difficult to separate issues of language from CAP; 3) even if we indicate that a child has a problem, what direction does it give us for remediation? Maybe we should just address the language learning deficit .. I don't have the answers, it needs further study. As a clinician I was approached by teachers and SPLs who diagnosed CAPD in their children. I'm not ready to concede that the whole area doesn't exist."

The questionnaire that you kindly filled out will be run soon.

1. I believe, as Chomsky states, that the acoustical signal carries little information.

1 – 2 – 3 = 2 4 = 4 5 = 9 6 = 21 7 = 35

Strongly Agree — Neutral — Strongly Disagree

2. Because of our cognitive abilities, we are able to anticipate/infer so much information that we have little need to hear and centrally process auditory information.

(SA)1 – 2 – 3 = 6 4 = 3 5 = 13 6 = 24 7(SD) = 25

3. Please choose the statement that most conforms to your thinking (circle a, b or c).
The phoneme carries _____ information when listening to speech.

a. no = 1 b. little = 21 c. much = 47

4. Phonemic knowledge (knowing what the speech sounds, sound like - consciously or unconsciously) is needed to develop the ability to: speak Y = 64 N = 7
read Y 51 N; 16 spell Y 56 N; 12 understand what people say Y 60 N. 10

5. I believe that the syllable carries important information:
Y 68 N. 4

6. I don't believe there is such a thing as central auditory processing.

(SA)1 – 2 = 2 3 = 4 4 = 4 5 = 12 6 = 18 7(SD) = 30

7. My belief/disbelief in CAP is based on the theories I hold.

(SA)1 = 18 2 = 20 3 = 8 4 = 16 5 = 5 6 – 7(SD) –

8. My belief/disbelief is based on my clinical experience.

(SA)1 = 14 2 = 15 3 = 11 4 = 12 5 = 8 6 = 4 7(SD) = 1

9. My belief/disbelief is based on my specific research in CAP.

(SA)1 = 7 2 = 8 3 = 8 4 = 15 5 = 4 6 = 10 7(SD) = 13

10. I feel, at this point, that I don't know enough about CAP.

(SA)1 = 24 2 = 16 3 = 16 4 = 7 5 = 6 6 = 3 7(SD) –

15. CAP tests are not as reliable as other diagnostic tests used by audiologists and speech-language pathologists.

(SA)1 = 8 2 = 6 3 = 12 4 = 19 5 = 6 6 = 7 7(SD) = 7

16. CAP tests are not as sensitive/specific as other diagnostic tests used by audiologists and SLP (e.g., comparing control group performance with that of a group with learning disabilities and presumably CAPD).

(SA)1 = 8 2 = 6 3 = 11 4 = 19 5 = 6 6 = 7 7(SD) = 3

17. CAP tests can reveal a lot about how to deal with the client's auditory problems.

(SA)1 = 4 2 = 2 3 = 18 4 = 14 5 = 11 6 = 10 7(SD) = 4

18. Tests of phonemic decoding are beyond the scope of audiology.

(SA)1 = 5 2 = 5 3 = 2 4 = 13 5 = 17 6 = 15 7(SD) = 11

19. Tests of phonemic decoding are beyond the scope of SLP.

(SA)1 = 1 2 = 3 3 = 1 4 = 9 5 = 16 6 = 16 7(SD) = 22

20. Selective attention is beyond the scope of audiology and SLP.

(SA)1 = 2 2 = 3 3 – 4 = 11 5 = 17 6 = 21 7(SD) = 16

21. Figure-ground measurements are beyond the scope of audiology and SLP.

(SA)1 = 1 2 = 1 3 = 3 4 = 11 5 = 17 6 = 18 7(SD) = 18

22. Central auditory testing should be limited to electrophysiologic procedures. (If you feel that there should be no CAP testing, please circle: DNA)

(SA)1 – 2 = 2 3 = 2 4 = 15 5 = 11 6 = 18 7(SD) = 18

23. I would not consider preferential seating for a person with a CAP problem.

(SA)1 – 2 = 1 3 = 1 4 = 3 5 = 10 6 = 19 7(SD) = 40

24. I would consider an FM auditory trainer (with limited output levels) to improve the S/N for a normal hearing child with CAP problems, if the child had difficulty understanding the teacher because of very noisy classroom conditions.

(SA)1 = 22 2 = 16 3 = 14 4 = 9 5 = 1 6 = 2 7(SD) = 2

25. I don't believe that it is possible to improve a young child's auditory processing with training.

(SA)1 – 2 = 2 3 = 2 4 = 7 5 = 20 6 = 18 7(SD) = 15

Figure 1. The objective questions and the responses made on the CAP questionnaire. Below each question are the response options and the number of respondents who chose that option.