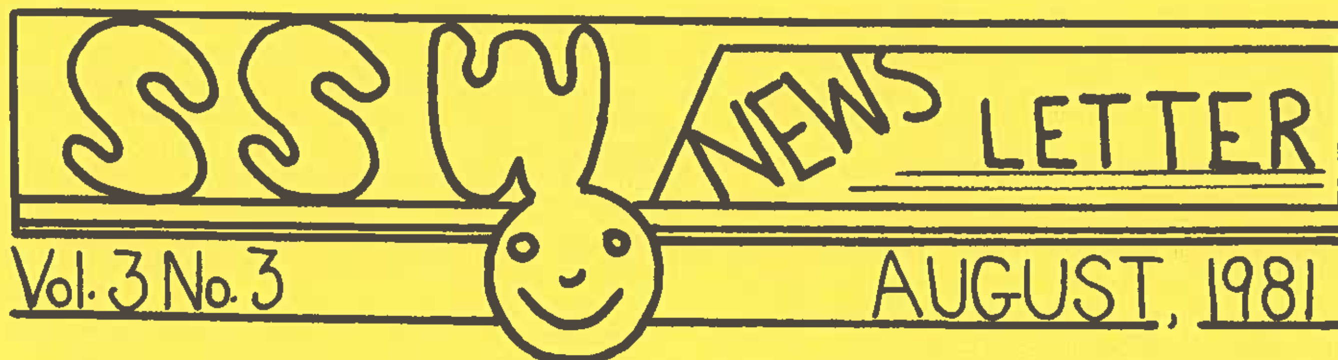

WHEN SSW AND CT SCANS DON'T AGREE

David "Max" McCarthy

In a recent study correlating the results of the SSW and CES tests with the anatomical sites of lesion noted on CT scans, four interesting cases were referred. As a result of a double blind procedure for subject referrals by a neurologist, four subjects were tested who subsequently were found to have normal CT scans. All of these subjects were being seen by a neurologist for clinical complaints and/or symptoms.

One subject, age 52, was an outpatient who had previously documented temporal lobe seizures. The CT scan for this subject was normal at the time of central auditory testing. Her results for the SSW and CES test were also normal, with a slight peak in the LC condition. She took about 10 seconds before responding to each item, showing a very concentrated effort.

Another subject, age 62, had a normal CT scan and normal SSW/CES results. Her neurologic complaints included weakness in the left arm and slurred speech. All other neurologic tests were negative and her responses on the SSW were very quick. Thus, these two subjects had complete agreement between results of central auditory testing and neurologic workup.

Two other subjects had abnormal SSW/CES results in the presence of normal CT scans. The first subject was a 50 year old male who was a known diabetic with a history of coronary problems. He was currently being seen for a possible transient ischemic attack. Positive neurologic data included left sided weakness and angiographic studies which indicated complete occlusion of the right carotid artery and 75% occlusion of the left carotid. Audiometric results indicated a bilateral high frequency sensorineural loss consistent with his 24 year history of industrial noise exposure. Results of central testing were as follows: 8 CNs 1 4 11 4/ 2 8 8 4; TEC-Mild; Response Biases-OE L/H (15/27); CES=RE 30 LE 30. These results indicated dysfunction in the right hemisphere which mildly involved the auditory reception center.

The other subject was a 65 year old female with complaints of dizziness and one incident in which she lost consciousness. No positive clinical neurologic signs were found. She had a high frequency S-N loss, bilaterally and excellent word discrimination scores. She exhibited 18 reversals and an anterior-Ear Effect, plus a mild TEC score on the SSW test. Her CES scores were bilaterally depressed and it was felt that she had NAR involvement in the superior portion of the reversal strip (frontal-parietal region). Despite the possibility of some central aging effect, it seems highly unlikely that such a specific result would be the expected outcome unless some localized dysfunction was present.

(cont. on pg. 4)

CES A VALUABLE "COMPANION" TO THE SSW

David "Max" McCarthy

The CES (Competing Environmental Sound) Test was developed to help differentiate right AR disorders from those of the interhemispheric pathways (most notable, the corpus callosum). It was also found that persons with right hemisphere lesions perform differently than those with left hemisphere lesions, when SSW and CES results were compared (Katz, Kushner, & Pack, 1975). The CES test consists of 14 different, familiar sounds presented in a binaural competing manner, and it is thought to test the type of processing associated with the right hemisphere. As with the SSW test, persons with lesions of the auditory reception center tend to have depressed scores in the ear contralateral to the damaged hemisphere.

In a recent study by McCarthy (1981), 10 normal subjects and 13 with central lesions were evaluated using the SSW/CES tests and a standard audiometric battery. The audiometric results were compared with the CT scan findings in 11 of the pathological subjects.

The mean error for the pathologic group was 18.6% in the right ear (range 0-55%) and 25.4% in the left (range 0-75%). Not all subjects had central auditory involvement. The difference between scores in the pathologic and normal groups was found to be statistically significant. Three subjects had no errors, one subject had 1 error in the left ear and one subject had a very mild RE peak, consisting of 3 errors (15%). Of the remaining 6 subjects, 2 had significant LE peaks (20%) and 4 had bilaterally depressed scores. Each of these six subjects were diagnosed by CT scan as having some involvement of the corpus callosum. Three had definite AR lesions, as well, while one other had possible AR involvement.

This bilateral peak of errors on the CES in R-hemisphere cases is analagous to the bilateral peak often noted on the SSW in L-hemisphere cases. A bilaterally depressed score was also found in patients with R-hemisphere lesions, which involved Heschl's gyrus, when they were tested using dichotically presented tonal sequences (Schulhoff & Goodglass, 1969).

In cases with lesions interrupting the auditory interhemispheric pathways (i.e., corpus callosum, anterior commisure), we can expect a peak of errors in the RE. Thus lesions involving both the corpus callosum and the R-AR would be expected to show a bilateral peak. This was the case in 2 of the pathologic subjects (including the probable AR case), while the other two with this type of involvement showed LE peaks. This "lack of consistency" may be due to a less defined auditory reception area with respect to music and environmental sounds, as compared to a more consolidated AR center in the dominant hemisphere for language. Language, and the subsequent encoding and decoding of it, may be easier to quantify in both normal and abnormal systems than environmental sounds. Processing which we associate with the R-hemisphere (or non-dominant hemisphere) is a more subtle type of which we know relatively little. Also, this type of processing is inevitably affected by language, hence the difficulty in quantifying its function. Still to be explored are individual differences in auditory reception in the R-hemisphere with respect to our idiosyncratic handling of tonal information and spatial/sequential relations. Let's hope more research will be done with both normal and abnormal R-hemisphere function, to help us understand the processing of non-verbal stimuli as well as we understand the processing of language.

References

Katz, Kushner, & Pack, The use of SSW and CES Tests for localizing brain lesions. Presented at ASHA Conv.,Wash.,D.C., 1975.

McCarthy, A Cross Validation of SSW & CES in Detecting Lesions of the CANS. Unpublished Master's Thesis, SUNY at Buffalo, 1981.

Schulhoff & Goodglass. Dichotic Listening, Side of Brain Injury and Cerebral Dominance. Neuropsychol., Vol. 7, 149-160, 1969.

IS THERE A POSTERIOR REVERSAL STRIP AND WHAT ARE REVERSAL-EAR-EFFECTS?

Michael Lindenman and Jack Katz

The "reversal strip" is considered to be in the Rolandic and anterior temporal regions of the brain bilaterally. Recently, the premotor area has been implicated as well (Katz, 1978). The reversal strip corresponds closely to the reversal areas noted by Efron (1965) and Luria (1970). Efron also found a visual reversal zone in the parieto-occipital region.

On occasion we have suspected that there might also be a posterior reversal site for the SSW. A large number of reversals were found in one patient who had only posterior involvement as seen on the CT scan. In another case, a 32-year old woman who was struck in the R-temporoccipital region had both a Type A (RC peak) and 7 reversals (all 7 on REF items). This constitutes a Reversal-Ear-Effect (Lukas, 1980).

We have considered two explanations for reversals in posterior lesion cases: 1) there is a posterior reversal region -- perhaps associated with the area described by Efron, or; 2) the refersals represent a strategy to avoid making errors.

It is because of these questions that the following case was of some interest. The patient is a 23-year old, R-handed grad student who had 2 operations to remove tumors from her L-hemisphere.

In Dec. 1976 (@ age 18), she noted headaches, stiff neck, diplopia (when looking to right), L medial strabismus, tinnitus LE, memory loss and possible L facial palsy. X-rays and EEG were normal. Brain scan and arteriogram showed a large L parieto-occipital tumor. The internal cerebral vein was shifted 2.5 mm to R; telescoping of Sylvian vessels and choroidal artery. The meningioma was removed 12-13-76.

In 1980 she experienced bitemporal headaches and spots in front of her eyes. The CT scan showed a recurrence of tumor at the original site. There was obliteration of L occipital horn (ventricle). At surgery (11-20-80) a mass was again removed. After recovery she was felt to have "no neurologic deficit."

Audiologic testing was carried out on a research basis Feb. 1981. At that time she noted a blind spot in lower R quadrant of each eye, tended to tire easily, had difficulty reading (picking out new concepts and principles) and had short term memory lapses (especially for sequential material). She was taking phenobarbital for seizure control.

On the SSW her TEC was normal (8 CNs = 0 0 0 1/ 1 2 0 0) but she had 11 rev. Item #20 was reversed: 3 - 1 2. This was the only LEF rev. It was followed by 10 reversals on all of the remaining REF items (all were 3 4 1 2). She reported that during the test she had the "impulse" to reverse some items, but had no idea that she actually did.

On Pinheiro's pitch pattern test in RE she had 6 errors, 12 reversals and 3 pauses to accommodate fatigue. In the LE she had 6 errors, 8 rev and 1 pause to accommodate fatigue. Her errors and rev. coincided with fatigue. After 30 sec. pauses she was flawless.

Lukas (1980) noted Reversal-Ear-Effects on the SSW. He found that certain patients had rev. almost exclusively when one ear was leading. He reported 2 cases with reversals primarily on REF items. Both cases had mostly LEF errors (col. E and F, 1 had a type A), but the reversals on the REF items. The R-E-E was 7 REF and 0 LEF in 1 case and 17 REF and 3 LEF in the other. One pt. was an adult with CP and the other had a R-hem stroke.

'he present case provides us with
'urther information, but leaves many
;uestions yet to be answered. We
:annot rule out the influence of the
›henobarbital on reversal behavior
.n this case. This factor should be
:hecked out, but for the sake of
liscussion here we shall assume that
:he influence is insignificant.

'he present case and 2 previous ones
:ited here show posterior rev. We
:now that at least 2 of them were
R-E-Es. We have seen it in both R-
ınd L-hem cases and sequencing dif-
:iculty not only on the SSW but on
:he pitch pattern test (monaural
node).

Ve do not know if all posterior rev.
:ases have R-E-Es and how this re-
Lates to the Type A pattern. We must
also keep in mind an association with
the corpus callosum (just above the
occipital horn). Not too much in-
formation has been gained as yet to
differentiate a posterior rev. area
(an inability to maintain the proper
order) from a strategy in dealing
with auditory information. We do
know that if it is a strategy, it is
unconscious -- this pt. did not know
:hat she had altered the sequence. As
in the case of the pitch patterns the
rev. could have been brought out by
fatigue, but it was only on the REF
items in the 2nd half of the test and
not on any of the LEF (therefore it is
not the more random sequencing difficulty
that we see in typical reversal cases).
One support for the strategy explanation
is that there were no LEF errors once the
pt. began to reverse REF items. Was she
employing a strategy for LEF items that
was quite useful and just used the same
approach for the REFs (so she began by
responding to all items with the words
she heard in the LE)?

Have you seen reversals in cases that
are known to have just posterior cerebral
lesions? Have you seen Reversal-Ear-Effects?
Site of lesion known? Was the person on
medication? Was the person prone to
reversals in spelling, writing or other
activities? R or L handed? Were the rev.
at the end of the test and did they relate
to the errors? Did you reinstruct the pt.?
Perhaps we can jointly solve this riddle.

<u>References</u>

Efron, R. (1965) as cited by R. Masland in Human Communication and its Disorders. NINDS, 1969.

Katz, J. (1978) SSW Workshop Manual. Allentown Industries: Buffalo, NY.

Lukas, R. (1980) Reversal-Ear Effect: Another response bias? SSW Newsletter, 2,2, pg. 5.

Luria, A. (1970) Traumatic Aphasia. Mouton: The Hague.

(SSW & CT Scans cont. from pg. 1)

Although the CT scan is a powerful diagnostic tool in pathology of the brain, it is known to be less accurate in locating posterior fossa disorders and certain types of pathology e.g., small metastatic lesions and transient ischemic attacks (Jacobs et al, 1976). The neurologist in this study felt that central auditory testing made a significant contribution towards documentation of physiologic dysfunctions in these patients. CT scan is based entirely on anatomical correlates of dysfunction, which can appear normal in the presence of known clinical symptoms and signs. It is precisely in these cases, where CNS involvement is not indicated by CT scans or where CT results are equivocal, that referrals for central auditory assessment would be in order.

<u>Reference</u>

Jacobs, L., Kinkel, W., & Heffner, R. Autopsy Correlations of Computerized Tomography: Experience with 6,000 Scans. <u>Neurology</u>, 26: 1111-1118, 1976.

STAGGERED DICHOTIC ALIGNMENT STUDIES

Floyd Rudmin, McGill University

The SSW Test, EC tape, is quite widely used in clinical audiology. But the mechanisms of its success are not known. A few studies have been reported on word onset alignment effects (Freeman & Beasley, 1976; Mathew & Garstecki, 1979). However, these studies have methodological and technical faults, plus they used the EC tape. In my opinion, the EC tape is not an appropriate instrument for studying the factors involved in preparing or responding to staggered dichotic speech tasks. It has too many parameters varying and interacting simultaneously. I have several experimental research manipulations of SSW design that I would like to pursue. However, I need the collaboration of someone with access to a modern psychoacoustic facility.

A. Onset Effects with Real Words

The studies mentioned earlier have focused on SSW dichotic word onset alignment. Onset alignment effects have been studied with non-sense CV syllables, but, as far as I am aware, have yet to be studied with real, meaningful words controlled for length. This should be done before looking for effects with such complex stimuli as the EC items. A set of words could be drawn up that start with plosives and end with phonemes that can be trimmed to some extent. For example, "daddy, baby, doggie, kitty" or "dogs, cows, pins, boys". These could be paired and recorded. Using a two-channel digital speech processing computer system, word onset alignment could be experimentally manipulated. Word offset alignment could be kept constant by trimming off excess duration. This would allow a controlled three-way design of 1) word onset alignment by 2) word familiarity, by 3) ear. If simple words were selected, a 4th factor of age could be added as well. Using a similar strategy, word offset effects could also be studied.

B. EC Tape Alignment

Katz aligned the EC items by repeatedly adjusting alignment until they satisfied some overall gestalt judgement of dichotic simultaneity. This procedure has yet to be examined experimentally. Again, a two-channel digital speech processing computer system would be useful. First, reliability should be established, i.e., can the same subject with the same standards make the same decision repeatedly? This could be studied by comparisons of paired alignments, or by giving the subject on-line control of alignment. Secondly, it should be determined whether the procedure is strictly psychoacoustic, or whether it is cognitively penetrable. This means to what degree the perceptual task is affected by subject background or preliminary set. This could be studied by experimentally manipulating subject set. Or, it could be studied bilingually. In this case, unilingual subjects would judge alignments of SSW items in their own and in another language. Differential effects for subject set or language would demonstrate that SSW alignment is cognitively penetrable.

These are a few of the experiments that I would like to consider. If anyone has similar interests and the necessary equipment, please contact me.

LITTLE KNOWN SSW FACTS

In 1966 Goldman & Katz compared dichotic, diotic and monaural administrations of the SSW test. The 24 R-handed Ss had their best performance in the standard dichotic condition. The diotic and monaural Right conditions had similar means. They were statistically poorer than the dichotic mean and better than the monaural Left. Twelve L-handers were then tested. The dichotic & monaural Left were equal to the R-handers but they were poorer in the Right & diotic conditions. There are important implications that can be derived from these results and these conditions could provide further diagnostic information on various cases(e.g., LD).

SSW NEWSLETTER
Jack Katz, Editor
State University of New York
4226 Ridge Lea Road
Amherst, NY 14226
(716) 831-3395

Guest editors for this issue were:

David "Max" McCarthy, M.A.
U of Texas Health Science Center
Houston, Texas

Richard Saul, M.A.
St U of NY at Buffalo
Buffalo, NY