

HOMOLOGOUS INTRUSIONS: AN ANALOGUE OF LINGUISTIC BLENDS¹

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Summary.—Homologous intrusions represent a frequent type of error in a task involving synchronous tapping with the fingers of both hands and reflect the incursion of one motor sequence on another in a manner resembling linguistic blends, such as EVOID, an inadvertent combination of EVADE and AVOID.

This study examined errors in a simple pattern of finger movement produced synchronously with the two hands. Two factors were manipulated: instructions to pay attention to one or the other hand (Exp. I) and stress or emphasis (Exp. II). In both experiments the basic procedure was as follows: *S* rested his fingers on 8 telegraph keys (wired to 2 high-speed Gerbrands event recorders each with 4 pens, realigned for each *S* to ensure accuracy of measurement). If the fingers of each hand are labeled 1 to 4 from left to right (palm down), then the basic task was to tap simultaneously with finger 1 of both hands, then fingers 2, 3, and 4. The reverse sequence 4321 was also run in counterbalanced order for all conditions. Ten practice trials preceded each condition; *S* then produced the sequence at maximum rate until told to stop, a signal that followed 20 repetitions of the pattern.

In Exp. I, three conditions were run in counterbalanced order: standard tapping (described above), attention right, and attention left. In the latter conditions *S* was instructed to "pay attention to or concentrate on" either his right or left hand. *Ss* were students (9 female and 11 male) enrolled in a basic psychology course; 17 were right-handed, 3 left-handed (average age 20 yr.). Their experience with typing and musical instruments ranged from 1 to 15 yr.

None of the 20 *Ss* was able to repeat the pattern 20 times in any of the conditions without making an error (as scored by two independent judges). A frequent type of error (classified as homologous intrusions) took the following form: an erroneous finger tapped in synchrony with an anatomically homologous finger of the opposite hand. For example, one hand often produced the correct sequence 1234 while the other hand erroneously produced 1224. Other less common homologous intrusions were 1324 (transposition) and 1231 (substitution). Fewer homologous intrusions occurred in the attended than in the non-attended hand ($\chi^2 = 31.50$, $p < .01$, 1 *df*). Fewer errors occurred in the dominant hand (right for the 17 right-handed *Ss* and left for the 3 left-handed *Ss*) than in the non-dominant hand ($\chi^2 = 6.92$, $p < .01$, 1 *df*). Direction of move-

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ment had a subtle effect: no difference was found in over-all frequency of homologous intrusions for the two directions of movement. However, significantly more homologous intrusions occurred in the left hand with direction 4321 than direction 1234 ($\chi^2 = 3.92, p < .05, 1 df$) and vice versa for the right hand ($\chi^2 = 3.86, p < .05, 1 df$). Finally, errors became more frequent toward the end of a sequence of 20 and toward the end of the experimental session, suggesting a fatigue effect. No statistically reliable relations were found between errors and age, sex, typing speed, years of experience in typing or playing the piano.

Stress or emphasis was varied in Exp. II (30 Ss). Three conditions were run (again in counterbalanced order): standard tapping, stress on finger 2, and stress on finger 3. In the latter conditions either finger 2 or finger 3 was tapped harder than the others. The stressed tap induced a homologous intrusion in the other hand more frequently than the identical but unstressed finger in the standard tapping condition ($\chi^2 = 6.76, p < .01, 1 df$).

Homologous intrusions reflect the incursion of one simultaneously programmed motor sequence on another in a manner not unlike linguistic blending. Blends are defined as involuntary intrusions of one simultaneously programmed word on another in conversational speech. For example HINPEDE reflects the intrusion of IMPEDE on HINDER in the sentence "They didn't want to hinpede his progress." And, analogous to the frequent intrusion of stressed finger taps in homologous intrusions, stressed syllables usually intrude in linguistic blends (unpublished observation). More specifically, we feel that theoretical assumptions of the following sort are needed to explain homologous intrusions: activating a finger of one hand primes or partially activates the anatomically homologous finger of the opposite hand. This "inter-manual" priming would facilitate the synchronous production of 1234 with the left hand and 4321 with the right, and virtually no errors are found using this task. But when both hands produce the sequence 1234 in synchrony as in our experiments, inter-manual priming would tend to cause homologous intrusion errors in one hand or the other. Which hand will produce the homologous intrusion depends in part on S's hand dominance, which hand S is paying attention to, and the direction of movement (the dominant direction being left to right for the left hand and vice versa for the right). Finally, priming is assumed to vary as a direct function of stress, which explains why stressed taps tend to induce homologous intrusions in the other hand more often than unstressed taps.

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