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Type A/Type B Personality Syndrome, Attention, and Music Processing

Typ A/Typ B Persönlichkeits-Syndrom, Aufmerksamkeit und musikalische Verarbeitungsprozesse

H. GOTLIEB and V. J. KONEČNI

The idea that behavior might contribute to the occurrence of coronary heart disease has received a considerable amount of research attention in the last 25 years. In particular, the "Type A" coronary-prone behavior pattern has been examined in some detail. The Type A individual is characterized as having three main behavioral tendencies: A sense of time urgency, extreme competitiveness, and aggressiveness (FRIEDMAN and ROSENMAN, 1974). The Type B personality has the relative absence of these characteristics (JENKINS, ROSENMAN and ZYZANSKI, 1974). The Type A behavior pattern appears to be a reliable predictor of coronary heart disease independently of other predictors such as smoking, family history, and serum cholesterol level (JENKINS, 1976).

The Type A response pattern is often displayed by those who wish to control their environment to an unusual degree (GLASS, 1977). This behavior pattern is most commonly elicited by situations where the person's sense of control has been threatened, or when the person feels aggressed upon or frustrated. However, the nature of the link between the Type A behavior and coronary heart disease has yet to be determined. It has been suggested, for example, that there may be a physiological factor mediating the relationship, in view of the fact that under certain circumstances Type A individuals show far greater arousal of the autonomic nervous system than do Type B individuals under the same conditions (e. g. SUNIN, 1982). Animal studies do indicate that a chronic arousal of the autonomic nervous system can lead to coronary heart disease (SCHNEIDERMAN, 1983), though this is yet to be proven in humans. An important related point here is that Type A individuals tend to suppress some of the internal symptoms in order to concentrate on a task (e. g. CARVER, COLEMAN, GLASS, 1976). Type A's inhibition of bodily symptoms could be a contributing factor to the high incidence of coronary

death found in these individuals, because attention to the preliminary symptoms of a heart attack appears to be a crucial factor in determining whether the victim survives.

From the point of view of the present experiment, the research background as described above points to a more general psychological feature of Type A individuals; namely, the tendency to ignore bodily changes appears to be only one component of a larger behavior pattern of focussing on a central task, or a central aspect of that task, to the exclusion of peripheral stimuli (MATTHEWS and BRUNSON, 1979). Type A individuals appear to be highly alert, yet inattentive to extraneous stimuli, and this focussing of attention seems to be strongest under those conditions which elicit Type A behavior (competitive, time-limited, aggression-laden situations).

The present research examined these highly important cognitive/attentional differences between the Type A and Type B individuals in the domain of music perception. The stimuli for this study consisted of three separate fugues, especially composed for this experiment (so that no subjects would be familiar with them), and four variations on a segment of each fugue. A fugue is a form of musical composition which consists of a melodic phrase repeated in various keys at various intervals. This phrase is then commonly adorned with accompanying embellishments. The melodic phrase, therefore, serves as the central attribute of the stimulus pattern, and the embellishments serve as peripheral stimuli or extraneous information.

Another variable examined in the present research was whether the subjects were "challenged" by the experimenter or not. Prior research (e. g., CARVER and GLASS, 1978; GLASS, 1977) has shown that the Type A behavior/personality/attentional pattern is particularly triggered in these individuals when their sense of control has been threatened or when they feel frustrated or aggressed against. This fact also provides a useful link between the present research and the substantial body of work on the relationship between negative emotional states, such as anger and fear, aggressive behavior, and music preference and exposure (KONEČNI, 1975, 1979, 1982; KONEČNI, CROZIER, DOOB, 1976).

Method

Stimuli. All music used in this study was composed specifically for this purpose. The selections were played on the piano and recorded on cassette tape.

Subjects, tasks, and procedure. Subjects for this study were undergraduates from the University of California at San Diego. A large group of subjects was administered the Jenkins Activity Survey (Form D) in a preliminary meeting. Those who scored in the top third of the distribution ($M = 13$) were classified as Type A and those scoring in the bottom third ($M = 4$) were considered Type B.

Twenty Type A and twenty Type B subjects were then called to participate in the experiment. Subjects came to the laboratory in groups of two or three. Each group was randomly assigned to a “challenge” or a “no-challenge” condition.

All subjects were first given a list of musical terms to define. Pilot testing showed that the terms selected were unfamiliar to lay subjects and therefore constituted an unsolvable task. Subjects in the no-challenge condition were told they were not expected to know the words, but were asked to spend a few minutes trying to define them. These subjects were reassured that their inability to complete the task was normal and expected. Subjects in the challenge condition were told the words were common musical terms with which they should be familiar, and were insulted for their inability to define them. They were told that they were the only ones who had been unable to complete the task.

The two tasks to be performed in the experiment were then explained. Subjects were told they would hear three musical pieces and that after each piece they would complete two tasks concerning the pieces' central phrase. Each piece consisted of a central phrase that was repeated four times along with diversified accompaniment. It was explained to subjects that the central phrase would be repeated throughout the piece. The suggestion was given that mentally rehearsing the central phrase upon completion of the piece might help the subjects' memory of the phrase. The order in which the tasks were performed was counterbalanced.

The first task (Contours Reproduction Test) involved drawing the pitch contour of the pieces' central phrase. Subjects were given oral and written instructions as well as an example of the pitch contour of the popular song “Twinkle-Twinkle Little Star”. A music staff was provided on which subjects were told to mark a dot for each note they heard in the central phrase. It was explained that the location of the dot should be based on where the note it represented fell in the pitch continuum relative to the preceding and following notes. One point was given for each correct change in pitch direction that a subject noted. As the central phrases of the three pieces contained 6, 7, and 7 notes, respectively, a total of 5 points was

possible for the first piece and a total of 6 points each was possible for the second and the third piece (the maximum score for the three fugue-like pieces was 17).

The second task (Recognition Test) required the subjects to determine which of the 4 shorter musical segments was contained in the longer piece. Each of the 4 segments played following each piece was of the same duration as the pieces' central phrase. Subjects were told that some of the shorter segments may have been contained in the longer piece. In actuality, only one (Segment 1) of the 4 segments was a part of the main piece. The remaining three segments consisted of: A segment (Segment 2) in which the central phrase of the main piece was maintained, but which had a different accompaniment; a segment (Segment 3) in which the accompaniment of the main piece was used, but employed a different central phrase; and, finally, a segment (Segment 4) which differed from the main piece in both the accompaniment and the central phrase, but was not drastically different from the other segments. The random order in which the segments were presented was different for each main piece.

After hearing each segment, subjects indicated whether or not they thought it was contained in the longer piece and used a 5-point scale to rate how sure they were that a segment was or was not a part of the main piece.

Results and Discussion

It was predicted that Type A subjects in the Challenge condition would excel on the Contours Reproduction Test because it should reflect the subjects' attention to the central attributes of a musical stimulus array (the three fugues' main themes) to the exclusion of the embellishments. This was indeed borne out by the data: The challenged Type As correctly reproduced a total of 11.8 pitch direction changes in the main themes of the three fugues, on the average (maximum score = 17), which was significantly more accurate than the performance of the other three groups, which, also as predicted, did not differ from each other ($M_s = 7.6, 8.8, \text{ and } 9.0$, for the Type A/No-Challenge, Type B/Challenge, and Type B/No-Challenge experimental conditions, respectively; throughout, all reported results are statistically significant at least at the $p < .05$ level).

The fact that the challenged Type A individuals tend to focus exclusively on the central part of a stimulus array, to the exclusion of peripheral information, also produced predictable differences in the subjects' perfor-

mance on the Recognition Test of the present experiment. The four groups did not differ from each other in their ability to state that Segment 3 (different central phrase in comparison to the main piece, but identical accompaniment) and Segment 4 (different central phrase and different accompaniment) were *not* a part of the main piece. Similarly, there were no differences in the recognition accuracy of the four groups with regard to Segment 1 (which was contained in the main piece in terms of both the central theme and the embellishment). It was their inferior performance in the recognition of Segment 2 (same central theme as the main piece, but different embellishment) which reflected the challenged Type A subjects' focus on the center to the exclusion of the periphery. Presumably because they did not attend to the accompaniment, they made numerous false-alarm errors in this segment ($M = 2.2$, with 3.0 being the maximum; in contrast, the main number of errors for Segment 2, also summed over all three pieces, were 1.4, 1.2, and 1.2 for the Type A/No-Challenge, Type B/Challenge, and Type B/No-Challenge experimental conditions, respectively).

Finally, it was predicted that the Type A individuals, especially when challenged, would be more prone to use the extremes of the certainty scale in comparison to the Type Bs. This prediction was not borne out by the data—no statistically significant differences among the four groups were observed.

In summary, when Type A individuals are challenged, they perform significantly better than others on tasks which require a single-minded focus of attention on the central features of a stimulus array. This very characteristic, however, hurts their performance when information that is crucial for the successful execution of the task is presented on the periphery of the array (cf. STRUBE, TURNER, PATRICK, PERRILLO, 1983).

On the whole, the present experiment was successful in linking the Type A/Type B research with the domain of music processing; additional extensions, which would examine potentially different emotional and physiological impact of music (e.g., KONEČNÍ, 1979) on Type A and Type B individuals, may be profitable.

Note

We would like to thank Tom AMOS of the Music Department of the University of California at San Diego for composing and recording the musical pieces.

REFERENCES

- CARVER, C. S., D. C. GLASS: Coronary-prone behavior pattern and interpersonal aggression. *J. Personality Soc. Psychol.* 36, 361-366 (1978).
- CARVER, C. S., A. E. COLEMAN, D. C. GLASS: The coronary-prone behavior pattern and the suppression of fatigue on a treadmill test. *J. Personality Soc. Psychol.* 33, 460-466 (1976).
- FRIEDMAN, M., R. H. ROSENMAN: *Type A Behavior and Your Heart*. New York: Knopf, 1974.
- GLASS, D. C.: *Behavior Patterns, Stress, and Coronary Disease*. New Jersey: Lawrence Erlbaum, 1977.
- JENKINS, C. D., R. H. ROSENMAN, S. J. ZYZANSKI: Prediction of clinical coronary heart disease by a test for coronary-prone behavior pattern. *New Engl. J. Med.* 290, 1271-1275 (1974).
- JENKINS, C. D.: Recent evidence supporting psychologic and social risk factors for coronary disease. *New Engl. J. Med.* 294, 987-994, 1033-1038 (1976).
- KONEČNI, V. J.: The mediation of aggressive behavior: Arousal level versus anger and cognitive labeling. *J. Personality Soc. Psychol.* 32, 706-712 (1975).
- KONEČNI, V. J.: Determinants of aesthetic preference and effects of exposure to aesthetic stimuli: Social, emotional, and cognitive factors. In: MAHER, B. A. (ed.), *Progress in Experimental Personality Research*. New York, Academic Press, 1979.
- KONEČNI, V. J.: Social interaction and musical preference. In: DEUTSCH, D. (ed.), *The psychology of music*. New York, Academic Press, 1982.
- KONEČNI, V. J., J. B. CROZIER, A. N. DOOB: Anger and expression of aggression: Effects on aesthetic preference. *Scient. Aesthet./Sciences de l'Art* 1, 47-55 (1976).
- MATTHEWS, K. A., B. BRUNSON: Allocation of attention and the Type A coronary-prone behavior pattern. *J. Personality Soc. Psychol.* 37, 2081-2090 (1979).
- STRUBE, M. J., C. W. TURNER, S. PATRICK, R. PERRILLO: Type A and Type B attentional response to aesthetic stimuli: Effects on mood and performance. *J. Personality Soc. Psychol.* 45, 1369-1379 (1983).
- SUNIN, R.: Intervention with Type A behavior. *J. Consult. Clin. Psychol.* 50, 933-949 (1982).

N. N.: Ich möchte gerne von Herrn KONEČNI wissen, wie aufwendig es ist, die Untersuchungspersonen den Typ A- und Typ B-Verhaltensgruppen zuzuordnen?

KONEČNI: Dieser spezielle Test, der Jenkins-Scale ist recht zuverlässig. Ob ein psychologischer Test wirklich das mißt, was er messen sollte, ist eine grundsätzliche Frage in der Psychologie. In unserem Fall ist der Jenkins-Scale korreliert mit den Parametern, von denen man das erwartet. So gibt es eine Reihe von Untersuchungen aus dem Bereich der Verkehrspsychologie. Man kann zum Beispiel die Häufigkeit der Betätigung des Bremspedals messen. Hier findet man hochsignifikante Unterschiede zwischen Typ A- und Typ B-Verhaltenspersonen.

N. N.: Wenn Sie eine zufällig ausgewählte Gruppe von Personen mit diesem Test untersuchen, können Sie dann die meisten der Versuchspersonen einem der beiden Extreme zuordnen, oder fallen die meisten in die Mitte zwischen Typ A- und Typ B-Verhalten?

KONEČNI: Der Test trennt sehr gut. Bei den meisten Personen gelingt die Zuordnung zu einem der beiden Verhaltensweisen sehr gut. Wenn es uns also gelingt, auf diese recht einfache Weise bei Personen im voraus festzustellen, ob sie eine persönlichkeitsbezogene Prädisposition für die Entwicklung einer koronaren Herzkrankheit haben, dann bin ich der Auffassung, daß dies ein sehr guter Test ist. Normalerweise bin ich psychologischen Persönlichkeitstesten gegenüber allerdings recht kritisch eingestellt. Aber hier tut ein solcher Test sehr gute Dienste.