Auditory Distraction and Reading Comprehension

James A. Lauterbach and Cynthia M. Pinkney

San Jose State University
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Recent studies on auditory distraction, specifically the presence of music, have presented researchers with a stronger understanding of the effect musical distraction has on reading comprehension (Banbury, Macken, Tremblay & Jones, 2001; Beaman, 2005; Campbell, 2005; Jones, 1999; Schroger, Giard & Wolff, 2000). The effect that auditory distractions, or irrelevant sounds, have on cognitive tasks and performance of introverts and extroverts is an important aspect to the study of reading comprehension for many reasons. First, by including personality type as a factor; both supervisors and professors will be able to distinguish differences in performance of employees and students while auditory distractions are present. Second, with this information, steps can be taken and programs can be developed to increase and improve an individual’s level of comprehension. Third, once the level of reading comprehension is improved, cognitive job task performance of employees and reading comprehension of students while studying would have the potential of massive improvement. There are currently millions of supervisors, professors, employees, and students who can benefit from such an improvement.

Although previous research has addressed the effects that auditory distraction has on reading comprehension, there is still little known of the difference between introvert and extrovert comprehension when cognitive activity is paired with musical distraction. Most research on auditory distraction has focused on activities such as educational homework or cognitive tasks in the workplace. The research has not included personality types as a factor that affects reading comprehension. With a study that involves introvert and extrovert-reading comprehension with or without the presence of music; researchers will also be able to understand the relationship between personality type and susceptibility to auditory distraction. Furthermore, with the knowledge gained from this project, researchers will be better educated on information
Reading Comprehension

Unlike everyday systematic problem solving that an individual has the ability to control, comprehension is automatic (Kintsch, 1998). Aside from auditory distractions, there are a variety of outside factors, internal and external, that affect reading comprehension. According to researchers Miall (1989) and Oatley (1992), human emotion is one such factor that is capable of directly affecting comprehension. The emotional responses that arise when an individual reads a text are sometimes thought of as more important than the actual comprehension of the content. Reading comprehension involves an individual’s understanding of a certain passage or particular text, and individuals may increase their level of reading comprehension by self assessment through summarizing, and by improving metacognition (Harris & Sipay, 1990). Metacognition is a process of self-regulated thinking, or thinking about one’s own thinking (Jacobs & Paris, 1987). Reading comprehension can also be improved, as illustrated by Kintsch (1998), by using coherent text to build a coherent mental representation of the presented text. Reading comprehension consists of four major processes: (a) word recognition, (b) parsing, (c) semantic interpretation, and (d) knowledge integration. Results will give researchers a foundation to build on and begin focusing on which factors are affected, in what type of personalities and in what type of environment. This study will lead the way into further investigation on how different people (personalities) process the four steps of reading comprehension.

Word recognition is a prerequisite for comprehension and is an easier process for the more advanced reader (Lien et al., 2006). A reader may use past knowledge and visual cues around the word to be recognized to make sense of the meaning of the word. Parsing involves
reading a text and being able to determine its grammatical structure (Clahsen & Felser, 2006). Lexical analysis, syntax analysis, and semantic analysis are the three stages involved in parsing.

Syntactic analysis involves making sure that words form proper and allowable expressions. There are two types of parsers: (a) top-down parsing, and (b) bottom-up parsing (Kintsch, 2005). Top-down parsing involves making a general hypothesis about a general structure and then comparing it to the fundamental structures in order to analyze unknown data in a text. Bottom-up parsing is the ability to first identify fundamental structures, and then produce superior structures in order to analyze text.

Semantic interpretation is the ability to interpret the various aspects of meaning contained in a form of representation such as language (Smythe, 1992). A reader uses semantic interpretation to identify and make sense of the text content. Knowledge integration is used to combine the understanding of a single subject in more than one way (Linn, 2006).

These reading comprehension processes require skill and concentration, and with the presence of an auditory distractor such as music, the reader might have difficulty comprehending the presented text. Not only will these crucial questions begin to be answered in this study, but the results will pave the way for further investigation in every process involved in reading comprehension. When research is narrowed to what type of people are more vulnerable to distraction, researchers are equipped to assess exactly what processes of reading comprehension is affected and in whom is it affected. As a result, future research can begin focusing on which type of programs or developments will aid individuals in their pursuit to complete success.

Auditory Distractions

Auditory distractions can affect comprehension even if the sounds are ignored or unrelated to the cognitive task at hand (Campbell, 2005). Previous research such as Campbell
(2005) shows why this line of research is so important: everyone is susceptible to the detrimental affects irrelevant sounds have on cognitive tasks, such as reading comprehension. Several studies show the decline in reading comprehension when auditory distractions are present (Banbury, Macken, Tremblay & Jones, 2001; Jones, 1999). Banbury, Macken, Tremblay & Jones (2001) found that irrelevant sounds often disrupt selective attention and impair cognitive performance. A similar study found reading comprehension levels decreased when irrelevant sounds were present during serial short-term memory tasks (Jones, 1999). These studies suggest the detrimental effects auditory distractions have on reading comprehension in laboratory environments. This line of research will extend these results by investing the same factors in a more realistic classroom setting.

Another related study concluded that distractions occurring in one’s natural environment required additional processing to the four complex processes already required for reading comprehension (Schroger, Giard & Wolff, 2000). The additional processing immensely affects reading comprehension. Auditory distractions affect different populations and different cognitive tasks (Beaman, 2005). These include reading and writing of children, adolescents and adults; and students and employees of all ages. Not all individuals execute cognitive tasks in a similar manner, and as a result, each individual experiences different outcomes. Consequently, it is imperative to examine the opposite affect as well.

Other research has focused more precisely on two different types of auditory distractions: vocal and instrumental, and the differing effects the two have on reading comprehension. This research suggests that not all irrelevant sound has a direct affect on complex cognitive tasks such as reading comprehension. Henderson, Crews, and Barlow (1945) observed that popular vocal music reduced participant reading comprehension. However, classical (instrumental) music had
no affect on reading comprehension. In a similar study, Boyle and Coltheart (1996) acknowledged that vocal sounds greatly interfered with participant recall, while instrumental music did not. The conflicting results of these studies illustrate the need for this line of research to make clear the effect of an instrumental distractor on reading comprehension.

Contradictory to a majority of past research involving the effects of auditory distraction on various cognitive tasks, Oliver (1997) found that background music has been associated with improved performance of reading comprehension within a learning environment. However, the results of this study can only be generalized to a population of at-risk incoming freshman that attended a university summer bridge program. Further research is needed to determine whether or not these claims can be applied to different populations. Despite differing views provided in past research on the effect irrelevant sound has on cognitive tasks, the presence of auditory distraction clearly has an influence on reading comprehension. Even though there is a clear influence, the direction of the influence is still unclear. Therefore, this line of research is important and needed to clarify the effect instrumental distractors have on reading comprehension of both introverts and extroverts.

Introverts and Extroverts

Empirical research has identified differences between introverts’ and extroverts’ personality characteristics (Furnham & Allass, 1999). These differences that make people unique also create a distinct way of performing certain tasks that are related to reading comprehension. For example, introverts outperformed extroverts on a reading comprehension task when the test was given in silence (Furnham & Allass, 1999). Differences between introverts and extroverts are important to include in research that specifically focuses on reading comprehension. Although more research regarding reading comprehension and personality types is necessary,
researchers have examined other areas that demonstrate differences between introverts and extroverts. Fouts and Click (1979) found extroverts to be more observational learners than introverts. They also suggested more powerful learning incentives may be considered for introverts as they benefit from nonsocial settings while learning. However, a contradictory study displayed extroverts as verbal learners and introverts as visual learners (Riding & Burt, 1982). It is important to note that the participants involved in Riding and Burt’s (1982) study included 11-yr-olds whose reading attainment was below average.

Although several studies illustrated differences between introverts and extroverts, many studies found no differences present. Studies that found no differences between introvert and extrovert reading comprehension did not include auditory distraction as a factor. Without the presence of auditory distractions, extroverts and introverts performed similarly on reading comprehension tasks (Furnham & Strbac, 2002; Ylias & Heaven, 2003). In a similar study, researchers reported any differences between introverts and extroverts, in regards to reading comprehension, to be statistically insignificant (Furnham, Gunter & Peterson, 1994). Past research on the differences between introvert and extrovert reading comprehension is contradictory and unstable. Therefore, this line of research is imperative in clarifying these differences because it accounts for the effect musical distraction has on different cognitive tasks of the two personality types.

**Personality Types and Musical Distractions**

When personality types and musical distractions are examined together they greatly affect reading comprehension. Extroverts outperformed introverts on a reading comprehension test regardless of the change in music from vocal to instrumental (Furnham, Trew & Streade, 1999). Introverts also reported being distracted during a reading comprehension test with
television noise present (Furnham, Gunter & Peterson, 1994). Not only are introverts distracted by music (vocal and instrumental), but they are also distracted by general background noise. Further research needs to occur before programs designed to enhance reading comprehension levels can be developed. Despite the type of distractions present, extroverts consistently outperformed introverts on reading comprehension tasks (Fouts & Click, 1979; Furnham & Allass, 1999; Furnham & Bradley, 1997; Furnham, Gunter & Peterson, 1994; Furnham & Strbac, 2002; Ylias & Heaven, 2003). Furnham, Gunter, and Peterson (1994) specifically stated that introverts admitted to being more distracted with the presence of noise. Personality types clearly have an affect on the way individuals read. Further research pertaining to personality types and musical distractions is important for improving the individuals’ level of reading comprehension. With more information about this, researchers will be able to generalize their results and develop programs designed to fit individual’s personality types and therefore enhance the reader’s comprehension ability. When programs are designed specifically to enhance the level of reading comprehension of the individual, individuals worldwide will achieve higher levels of success in their careers, studies, and everyday activities.

Previous research has addressed the effect auditory distractions have on reading comprehension. However, the research has not effectively addressed the different effects that the presence or absence of music has on introverts’ and extroverts’ comprehension. The current line of research will address the relationship between auditory distraction and personality type by assessing participants’ abilities to comprehend text with the absence or presence of music. The two groups of participants will both be tested on reading comprehension ability with or without the presence of music. Participants will take a personality test to distinguish introvert or extrovert personality type. This study seeks to produce useful information for researchers and social
institutions that will help determine the relationship between auditory distraction and personality type.

Method

Participants

This experiment included 82 native English speaking (male and female), college students enrolled at San Jose State University who participated for course credit in Introductory Psychology. Researchers divided participants into two separate personality groups: introverts and extroverts. Introversion and extroversion was determined with the use of the International Personality Item Poll (IPIP) scale of extroversion (Goldberg et al., 2006).

Materials

The IPIP is a 20-point scale that consists of 10 positively keyed items (extroversion characteristics), and 10 negatively keyed items (introversion characteristics). Participants assigned a numeric value to these 20 personality characteristics using a five-point Likert scale. Each participant was asked to read the same text with or without the presence of the second movement from Charles Ives’ (1911) Trio for Violin, Violoncello and Piano. The text (see Appendix A) is a Native American folk tale used in Bartlett’s (1932) experiments on the reconstruction of memories. This text is unfamiliar to the particular sample selected for this experiment. Each participant was asked to recall as much information as possible from the text, and record it on a separate piece of paper that was handed out simultaneously with the text. Participants used designated writing materials to eliminate the possibility of note taking. Researchers played the instrumental distractor throughout the reading task for two of the four experimental conditions (introverts with musical distractor, and extroverts with musical distractor).
Procedure

Upon arrival, participants signed an attendance sheet required by the research department of San Jose State University. Participants then read a standard set of instructions (see Appendix B), as well as read and signed the consent form (see Appendix C). Experimenters presented the instructions both in print and verbally to account for both verbal and non-verbal processing (Paivio, 1986). In all four conditions, researchers presented participants with both a copy of the text and a blank sheet of paper for responses. Each participant was allocated a standard time, 1 min 45 s, to read the presented text with or without the presence of music. The allotted time was obtained by averaging the time it took pilot participants to read the text. After participants completed the reading, experimenters collected the sheet of paper containing the text, and distributed the designated writing utensils. Participants had 5 min (also obtained from pilot participant averages) to recall as much information as they could on the blank sheet of paper. Responses were then collected, and the personality tests (see Appendix D) were distributed to each participant to determine introversion or extroversion. Upon completion of the personality test, each participant turned in both the test and pen, and was then dismissed from the classroom.

The experiment was conducted in two sessions: (a) with and (b) without the presence of the instrumental distractor. The first session contained 42 participants and the second session contained 40. All experimental conditions were identically administered with the exception of the presence or absence of an instrumental distractor. Each participant’s personality test, text, and blank sheet of paper were individually numbered.

Design and Analysis

Experimenters compared the participants’ responses to idea units (see Appendix E) previously identified by the experimenters. The idea units are an adaptation of Bovair and
Kieras’ (1985) work on propositional analysis, and follow three main patterns: (a) noun, verb, complement, (b) noun, verb, and (c) noun, adjective. This experiment was conducted using a two-by-two between-subjects design and consisted of four experimental conditions. Each of the four conditions contained at least four participants, either introverts or extroverts, with a total of 82 participants. This experiment took place in the same classroom setting for both sessions and all four experimental conditions. The independent variables included both personality types and the presence or absence of music. The measure of the dependent variable, reading comprehension, is the total number of correctly recalled idea units. This measure represents the effect musical distractions have on introvert and extrovert reading comprehension levels.

Results

This study evaluated the effects of an instrumental distractor on reading comprehension, and the difference between personality types (extroverts and introverts). This experiment was conducted using a two-by-two between-subjects design and consisted of four experimental conditions: (a) extroverts with music, (b) introverts with music, (c) extroverts without music, and (d) introverts without music. The independent variables included both personality types and the presence or absence of music. The measure of the dependent variable, reading comprehension, is the total number of correctly recalled idea units.

Main Effects of Musical Distractor

Participants who read the text without the presence of a musical distractor comprehended more (M = 14.2, SD = 7.00) than participants who read the text with the presence of a musical distractor (M = 9.5, SD = 5.68). This effect was statistically significant, \( F(1, 78) = 10.133, p < .002. \)

Main Effects of Personality
Participants that scored high on extroverted personality characteristics comprehended more (M = 12.3, SD = 6.56) than participants who scored low on extroverted (high on introverted) personality characteristics (M = 9.8, SD = 7.16).

Interaction of Musical Distractor and Personality

The interaction of the musical distractor and personality was not statistically significant $F(1, 78) < 1$. However, extroverts outperformed (M = 10.4, SD = 5.36) introverts (M = 7.6, SD = 6.10) with the presence of the musical distractor. Introverts outperformed (M = 16.7, SD = 6.29) extroverts (M = 13.9, SD = 7.09) without the presence of the musical distractor. It is important to note the fluctuation of the introverts’ performance, obtaining the lowest and highest means in each condition.

Discussion

Auditory distractions occur everyday, affecting each person differently. However, how much do they affect each person and what kind of people are more susceptible to these distractions? This experiment aimed at answering these questions. This experiment examined the effects that musical distractions and personality types have on reading comprehension. The personality types (introversion and extroversion) were chosen and scored on a continuous scale to ensure that every participant would be categorized into only one category. This study took place in a school setting to demonstrate the affects music has in a place where much reading comprehension takes place. The goal of this study was to examine how much distractions affect an individual’s performance on reading comprehension tasks as well as to examine which type of people are more likely to be affected by this distraction.

In this study, the effects of music on reading comprehension were statistically significant. Both groups performed poorer during the condition when the music was present. These results
suggest that music is, in fact, a distraction when an individual is trying to read and comprehend a
text. They also suggest that music independently affects reading comprehension. This study
demonstrated the detrimental effects of music on reading comprehension tasks, but what remains
undiscovered are the types of distractions that affect reading comprehension. For example, does
television noise or general background noise (A train going by or a horn honking, a telephone
ringing) distract the way music does. Furthermore, if television and general noise do have
detrimental affects on reading comprehension, which one is more of a distraction than the other?
These topics are imperative in future research, especially in developing ways to improve reading
comprehension scores.

As future research begins to assess the different affects of different types of noise then
and only then can programs be successfully designed to enhance an individuals reading
comprehension ability. This line of research is just a stepping-stone in the process of discovering
a way to increase individuals reading comprehension skills. In order to accurately develop
specific programs researchers must first uncover which type of individual is susceptible to which
type of distraction. Once these questions are completely answered programs can be developed to
increase an individuals reading comprehension ability. By doing this each person will be
equipped for success in their present or future careers, studies and everyday activities.

Although the effects of personality types on reading comprehension were statistically
insignificant, the numbers suggest otherwise. Introverts did outperform extroverts when the task
was given in silence. These findings propose that introverts generally obtained better reading
comprehension skills. These findings also raise the question of why did introverts perform better
than extroverts in reading comprehension? How does there personality effect reading
comprehension scores? As a result, of the consistent out performance by introverts, these questions should guide future research.

A factor believed to have contributed to the low statistical results was the lack of participants in each condition. As stated earlier introverts did outperform extroverts when the test was given in silence, however the small number of introverts made it difficult to obtain statistically significant results. If you look at graph one, it is clear that introverts and extroverts performed differently during the no music condition. This finding suggests that the problem was not in the procedure, but in the methods where limited amounts of participants were examined.

When the interaction of music and personality types was examined, no statistically significant data was discovered. Although the results suggest that only music affected reading comprehension, the raw data does not. In graph one it is clear that extroverts outperformed introverts during the presence of music. The same results were supported by many other studies (Fouts & Click, 1979; Furnham, Trew & Streade, 1999). This leads us to believe that the reason no relationship was found during the interaction of music and personality types was because of the lack of statistical support among personality types as an independent factor. The consequence of personality types not being strong, affected the interaction and it therefore followed a similar pattern. Secondly, our data followed the same patterns as the other studies, but it was not to the same degree. Because our data shadowed those who obtained a statistical significance for the interaction, we believe that with the right amount of participants the personality types would have made more of an affect on reading comprehension and as a result, so would the interaction.

This study began a line of research that is imperative to the understanding on how to better reading comprehension. This study demonstrated the effects music has on reading
comprehension on both personality types. It has shown that under the condition of a musical
distractor both groups performed worse. However, researchers must continue to investigate what
type of distractor has a greater affect on the individual. Furthermore, researchers must also focus
on which types of personalities are more susceptible to which distractor.

Researchers can begin their journey of discovery by investigating other personality types.
By branching out to other defining personality characteristics, researchers will soon be able to
generalize their results beyond types of introversion and extroversion. Secondly, researchers
must compare each type of distractor in order to decipher which one shows more of an affect
than the other. By doing this, researchers will eventually be able to state which personality type
will be affected by which distractor.

Once these questions are successfully answered, the next step is developing programs or
environments that will benefit each individual. As stated earlier, reading comprehension plays
an enormous role in our society and distractions are everywhere. By developing programs
designed to eliminate these negative effects, individuals will be able to increase their reading
comprehension, which will be reflected in their careers, studies and everyday activities.
References


Appendix A: War of the Ghosts

One night two young men from Egulac went down to the river to hunt seals and while they were there it became foggy and calm. Then they heard war-cries, and they thought: "Maybe this is a war-party". They escaped to the shore, and hid behind a log. Now canoes came up, and they heard the noise of paddles, and saw one canoe coming up to them. There were five men in the canoe, and they said:

"What do you think? We wish to take you along. We are going up the river to make war on the people."

One of the young men said, “I have no arrows."

"Arrows are in the canoe," they said.

"I will not go along. I might be killed. My relatives do not know where I have gone. But you," he said, turning to the other, "may go with them."

So one of the young men went, but the other returned home.

And the warriors went on up the river to a town on the other side of Kalama. The people came down to the water and they began to fight, and many were killed. But presently the young man heard one of the warriors say, "Quick, let us go home: that Indian has been hit." Now he thought: "Oh, they are ghosts." He did not feel sick, but they said he had been shot.

So the canoes went back to Egulac and the young man went ashore to his house and made a fire. And he told everybody and said: "Behold I accompanied the ghosts, and we went to fight. Many of our fellows were killed, and many of those who attacked us were killed. They said I was hit, and I did not feel sick."

He told it all, and then he became quiet. When the sun rose he fell down. Something black came out of his mouth. His face became contorted. The people jumped up and cried.

He was dead.

Frederic Bartlett
Appendix B: Instructions

Experiment Instructions

Please read the following instructions carefully:

After signing the consent form, put away all writing utensils and remove any objects from your desk. Experimenters will collect these instructions and the consent forms, and will pass out two sheets of paper to each participant. Both sheets of paper will be numbered in the upper right-hand corner. Please make sure that the number from each sheet of paper matches. One sheet will contain a short story and will be given to you face down. DO NOT turn the sheet of paper over until instructed to do so. The other sheet of paper will be blank. Do not write on either sheet of paper. When instructed to do so, turn the sheet of paper over and begin reading the story. You will have 1 min 45 s to read the story. Be sure to focus on what you are reading as you will be asked to recall as much as you can remember from the story. When the time allotted has elapsed, experimenters will collect the short stories and pass out pens. DO NOT write anything on the blank sheet of paper until instructed to do so. Once every participant has received a pen, you will have 5 min to write down as much information as you can remember from the story on the blank sheet of paper. Please write down any and all words, phrases, quotes, or sentences you can remember. Please write as much as you can remember from the story with the time allotted. When the 5 min has passed, experimenters will instruct all participants to cease writing and put all pens down. Experimenters will then collect your responses and pass out a short questionnaire. Make sure the number on your questionnaire matches the number that was printed on the two original sheets of paper given to you. Please read the questionnaire instructions carefully and complete it as accurately and honestly as possible. Once each participant has completed the questionnaire, experimenters will collect the questionnaires and the pens. If you have any questions regarding the experiment, they will be answered after the questionnaires have been collected. Following any questions, the experiment will be complete, and you will be dismissed. If you have any questions regarding these instructions, please ask them now.

*Note:
If you do not follow these instructions accordingly, you will not receive credit for participation in this experiment.
Appendix C: Consent Form

Consent Form

The information in this consent form is provided so that you can decide whether you wish to participate in our study. It is important that you understand that your participation is considered voluntary. This means that even if you agree to participate you are free to withdraw from the experiment at any time, without penalty.

This study is an investigation into some of the basic processes we use to understand text. For this study, you will read a text and write down as much as you can recall from it. Your individual responses will remain anonymous and will not be discussed with anyone.

This experiment poses no known risks to your health and your name will not be associated with the findings. Also, upon completion of your participation in this study you will be provided with a brief explanation of the question this study addresses. If you have any questions not answered by this consent form, please do not hesitate to ask.

Thank you for your time.

James Lauterbach (408-540-9451)                                           Cynthia Pinkney (714-883-6385)

_______________________________________________  _______________________________________
(Researcher’s Signature)                                                          (Researcher’s Signature)

Consent Statement:

I have read the above comments and agree to participate in this experiment. I understand that if I have any questions or concerns regarding this project I can contact the investigators at the above location.

_______________________________________________  ______________________________
(Participant’s signature)                                                          (Date)
Appendix D: Personality Test

In the table below, there are phrases describing people's behaviors. Please use the rating scale provided to describe how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence. Please read each statement carefully, choose the best response, and fill in your responses using the corresponding number.

Response Options:
1: Very Inaccurate
2: Moderately Inaccurate
3: Neither Inaccurate nor Accurate
4: Moderately Accurate
5: Very Accurate

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response</th>
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<tbody>
<tr>
<td>Feel comfortable around people.</td>
<td></td>
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<tr>
<td>Have little to say.</td>
<td></td>
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<tr>
<td>Make friends easily.</td>
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<tr>
<td>Keep in the background.</td>
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<tr>
<td>Am skilled in handling social situations.</td>
<td></td>
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<tr>
<td>Would describe my experiences as somewhat dull.</td>
<td></td>
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<tr>
<td>Am the life of the party.</td>
<td></td>
</tr>
<tr>
<td>Don't like to draw attention to myself.</td>
<td></td>
</tr>
<tr>
<td>Know how to captivate people.</td>
<td></td>
</tr>
<tr>
<td>Don't talk a lot.</td>
<td></td>
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<tr>
<td>Start conversations.</td>
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<tr>
<td>Avoid contacts with others.</td>
<td></td>
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<tr>
<td>Warm up quickly to others.</td>
<td></td>
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<tr>
<td>Am hard to get to know.</td>
<td></td>
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<tr>
<td>Talk to a lot of different people at parties.</td>
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<tr>
<td>Retreat from others.</td>
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<tr>
<td>Don't mind being the center of attention.</td>
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<tr>
<td>Find it difficult to approach others.</td>
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<tr>
<td>Cheer people up.</td>
<td></td>
</tr>
<tr>
<td>Keep others at a distance.</td>
<td></td>
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Scoring the IPIP Scale (http://ipip.ori.org/):

+ keyed items represent extroversion characteristics
- keyed items represent introversion characteristics

20-item scale (Alpha = .91)

+ keyed items:
  Feel comfortable around people.
  Make friends easily.
  Am skilled in handling social situations.
  Am the life of the party.
  Know how to captivate people.
  Start conversations.
  Warm up quickly to others.
  Talk to a lot of different people at parties.
  Don't mind being the center of attention.
  Cheer people up.

- keyed items:
  Have little to say.
  Keep in the background.
  Would describe my experiences as somewhat dull.
  Don't like to draw attention to myself.
  Don't talk a lot.
  Avoid contacts with others.
  Am hard to get to know.
  Retreat from others.
  Find it difficult to approach others.
  Keep others at a distance.

Converting IPIP Item Responses to Scale Scores:

For + keyed items, the response "Very Inaccurate" is assigned a value of 1, "Moderately Inaccurate" a value of 2, "Neither Inaccurate nor Accurate" a 3, "Moderately Accurate" a 4, and "Very Accurate" a value of 5.

For - keyed items, the response "Very Inaccurate" is assigned a value of 5, "Moderately Inaccurate" a value of 4, "Neither Inaccurate nor Accurate" a 3, "Moderately Accurate" a 2, and "Very Accurate" a value of 1.

Once numbers are assigned for all of the items in the scale, sum all the values to obtain a total scale score. The total scale score ranges from 20 to 100, the mean being 60. Any score above 60 represents extroversion, and any score below 60 represents introversion.
Sentence 1:
men, go, hunt
men, go, one night
men, hunt, seals
men, at river
men, young
men, two
men, from Egulac
while (men at river), (weather, foggy), (weather, calm)
(weather), foggy
(weather), calm

Sentence 2:
they, heard, war-cries
they, thought, war-party

Sentence 3:
they, escaped, to shore
they, hid, behind log

Sentence 4:
canoes, came, up
ty, heard, noise
noise, of, paddles
ty, saw, canoe
canoe, coming up, to them

Sentence 5:
five, men
men, in canoe
they, said
what, do you, think

Sentence 6:
we, wish to, take you
take, you, along

Sentence 7:
we, going up, to make war
we, make, war
war, on, the people

Sentence 8:
man, young
one, man
man, said, I have no arrows
I, have, no arrows

Sentence 9:
arrows, in, canoe
they, said

Sentence 10:
I, will not go, along

Sentence 11:
I, might be, killed

Sentence 12:
relatives, do not know, where I have gone
I, go, where

Sentence 13:
you, may go with, them
he said, you may go
he turn, to other

Sentence 14:
man, young
one, man
man, went
other man, returned, home

Sentence 15:
warriors, went, up river
warriors, went, to a town
warriors, went, to other side
warriors, went, to Kalama

Sentence 16:
people, came down, to water
people, came down, to fight
they, began, to fight
many, were, killed

Sentence 17:
young, man
man, heard, warrior say
warrior, said, “let us go home”
we, go, home
warrior, said, “that Indian has been hit”
Indian, hit

Sentence 18:
he, thought, ghosts
they, are, ghosts

Sentence 19:
he, did not feel, sick
they, said,
he had been shot

Sentence 20:
canoes, went back, to Egulac
young, man
man, went, ashore
man, went, to his house
man, made, fire

Sentence 21:
he, told, everybody
he, said, “I accompanied ghosts”
he, said, “we went to fight”
I, accompanied, ghosts
we, went, to fight

Sentence 22:
many fellows, were, killed
many attackers, were, killed

Sentence 23:
they, said, I was hit
I, was, hit
I, did not feel, sick

Sentence 24:
he, told, it all
he, became, quiet

Sentence 25:
sun, rose
he, fell, down

Sentence 26:
something black, came out, his mouth
Sentence 27:
   face, became, contorted
   his, face

Sentence 28:
   people, jumped up
   people, cried
   jumped, and, cried

Sentence 29:
   he, died

**Rules for Coding the Recall of Idea Units:**
(1) One point is allotted for every correctly recalled idea unit.
(2) Synonyms and class generalizations are acceptable and are allotted one point.
(3) Faulty reproduction of idea units will not be accepted and will not be allotted any points.
Appendix F: Script for No Music Exposure

<Participants arrive>

“Hello everyone, please be seated”

<Participants sit down. Experimenters pass out instructions and consent form>

“I am going to pass out a set of instructions, and a consent form for this experiment. Please carefully read the instructions and the consent form, and sign the bottom of the consent form if you agree to further participate in this experiment.”

<Participants read instructions and sign consent form. Experimenters collect instructions and consent forms>

“I am now going to pass out two pieces of paper to you: one containing a story and the other blank. Please keep the paper with writing face down until instructed to turn it over.”

<Pass out both papers, blank and sheet containing text>

“When instructed to do so, you will have 1 min 45 s to read the text. Be sure to focus on what you are reading because you will be asked to write down as much as you can remember from the story. After the time is up, turn the paper back over and I will come and collect them. When I collect your paper I will also give you a pen that you will be required to write with. You will then write on the blank sheet everything you remember from the story. You may now turn over your paper and begin reading.”

<Time 1 min 45 s>

“Stop. Please turn you paper face down and I will come collect them.”

<Collect the papers and pass out the pens>
“When I tell you to begin, with the pen that was given to you, please write on the blank sheet absolutely everything you can remember from the story. You will have 5 min to do so. When the time allotted has passed, I will collect your answer. Ok, begin.”

<Wait 5 min for participants to complete their responses. Collect the responses>

“I am now going to pass out a questionnaire, please read the instructions carefully, and answer the questions as accurately and honestly as possible. There is no time limit; so when you are finished please turn the questionnaire over.”

<Pass out questionnaire (personality test) and wait for participants to complete it>

<Collect the personality tests>

“Thank you for participating in this experiment. The goal of this experiment was to examine the effect musical distractions have on the reading comprehension of both introvert and extrovert personality types. Does anyone have any questions?”

<Answer any questions>

“Thanks for coming. You are free to leave at this time.”

<Study is complete>
Appendix G: Script for Music Exposure

<Participants arrive>
“Hello everyone, please be seated”

<Participants sit down. Experimenters pass out instructions and consent form>
“I am going to pass out a set of instructions, and a consent form for this experiment. Please carefully read the instructions and the consent form, and sign the bottom of the consent form if you agree to further participate in this experiment.”

<Participants read instructions and sign consent form. Experimenters collect instructions and consent forms>
“I am now going to pass out two pieces of paper to you: one containing a story and the other blank. Please keep the paper with writing face down until instructed to turn it over.”

<Pass out both papers, blank and sheet containing text>
“When instructed to do so, you will have 1 min 45 s to read the text. Be sure to focus on what you are reading because you will be asked to write down as much as you can remember from the story. After the time is up, turn the paper back over and I will come and collect them. When I collect your paper I will also give you a pen that you will be required to write with. You will then write on the blank sheet everything you remember from the story. You may now turn over your paper and begin reading.”

<Turn on music and time 1 min 45 s>
“Stop. Please turn you paper face down and I will come collect them.”

<Collect the papers and pass out the pens>
“When I tell you to begin, with the pen that was given to you, please write on the blank sheet absolutely everything you can remember from the story. You will have 5 min to do so. When the time allotted has passed, I will collect your answer. Ok, begin.”

<Wait 5 min for participants to complete their responses. Collect the responses>

“I am now going to pass out a questionnaire, please read the instructions carefully, and answer the questions as accurately and honestly as possible. There is no time limit; so when you are finished please turn the questionnaire over.”

<Pass out questionnaire (personality test) and wait for participants to complete it>

<Collect the personality tests>

“Thank you for participating in this experiment. The goal of this experiment was to examine the effect musical distractions have on the reading comprehension of both introvert and extrovert personality types. Does anyone have any questions?”

<Answer any questions>

“Thanks for coming. You are free to leave at this time.”

<Study is complete>
Table 1

*Mean Comprehension Score of Extroverts and Introverts with or without the presence of Music*

(N = 82)

<table>
<thead>
<tr>
<th>Personality Type</th>
<th>With Music</th>
<th>Without Music</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrovert</td>
<td>10.41</td>
<td>13.86</td>
</tr>
<tr>
<td>Introvert</td>
<td>7.62</td>
<td>16.75</td>
</tr>
</tbody>
</table>

Graph 1

*Mean Comprehension Score of Extroverts and Introverts with or without the presence of Music*