DO STEREOTYPES SIMPLIFY COGNITIVE PROCESSING? EXAMINING THE COGNITIVE TOOLBOX THOUGH A REPLICATION AND EXTENSION OF MACRAE ET AL. (1994)

by

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Abstract

Stereotyping occurs in a wide variety of situations and can have severe and negative consequences. One potential explanation for the function of stereotypes offered by Macrae et al. (1994) is that they allow easier mental categorization of individuals and alleviate cognitive load. This can result in more attention for other tasks. In this thesis, I replicated Macrae et al.'s (1994) Study 1 using similar materials and procedures, while also addressing potential limitations to their research. Macrae et al. (1994) found that providing stereotype labels facilitated performance on a secondary task. In my replication study, I found no such facilitation effects. Further research needs to be done to fully understand the relationship between stereotyping and its potential to relieve cognitive load, but my study casts doubt on the reliability of Macrae et al.'s (1994) findings.

Do Stereotypes Simplify Cognitive Processing?

Examining the Cognitive Toolbox though a Replication and Extension of Macrae et al. (1994)

Social psychologists have found that it takes a mere 39 milliseconds to make judgments about people based on their appearance (Bar et al., 2006). To put this into perspective, blinking takes approximately 400 milliseconds. In nearly one tenth of the time it takes to blink, an individual can make judgments about another person using only a photo of their face.

Impression formation—the initial response to meeting a new person or hearing information about them—provides a mental framework for understanding that person's actions and behaviors (Riggio & Friedman, 1986). Using and analyzing any information available, one can effectively categorize people into more easily understood classifications. For example, if you witnessed a man cut in front of a line of people, you may immediately categorize him as selfish and rude. Stereotypes, highly organized social categories, often serve as a catalyst to this process (Anderson et al., 1990). A stereotypic social category can be a noun or noun phrase (e.g., elementary school teacher, felon) and can have a positive or negative connotation depending on the stereotype. If you later found out that the man who cut in front of the line of people was a used car salesman, you might further categorize him as untrustworthy or underhanded. If you had received this information first, you might have expected his questionable behavior sooner and been able to categorize him more quickly before having to witness his actions.

Although stereotypes might speed up the impression formation process, it is important to note that stereotypes can have severe negative consequences (Bodenhausen & Wyer, 1985). For example, if managers use stereotypes when reviewing applicants for employment, they might pass over qualified applicants in favor of a perceived "better" stereotype label (Glick et al.,

1988). Similarly, if jurors use stereotypes when forming impressions of defendants, innocent people might get sent to jail (Devine & Caughlin, 2014). In cases where the stakes are high, it becomes clear that stereotyping can be dangerous. Stereotypes can be prejudicial and discriminatory in social application, and steps should be taken to minimize their impact.

If stereotyping can have extreme, negative consequences, what potential function do they serve? One theory is that stereotypes can be used as tools that free up cognitive resources for other necessary or desirable activities (Macrae et al., 1994). On any given day, people encounter copious amounts of information about our surroundings. This information is so abundant that it would be impossible to pay attention and take note of everything; therefore, it makes sense that individuals would utilize anything they can to simplify the world into something more comprehensible and less overwhelming. Stereotyping may be one of those tools, allowing an individual to participate in more simultaneous activities and expand their attention across more things at once.

Indirect evidence for the notion that stereotypes help free up cognitive resources comes from studies examining stereotyping when cognitive resources are depleted. Many studies have found evidence that people tend to rely on stereotypes more when in cognitively stressful situations (e.g., Bodenhausen, 1990; Nolan et al., 1999; Sherman et al., 2004; Stewart et al., 2003). For example, Bodenhausen's (1990) study examined participants' tendency to stereotype depending on the time of day. All participants were presented with three scenarios describing a person and alleged crime. Depending on the participants' condition, the scenarios contained stereotypic information suggesting the person was guilty (e.g., a student who was accused of cheating was described as an "athletic star" or not). The participants' task was to determine how guilty the person in the scenario was. Participants who described themselves as "morning

people" tended to stereotype more when tested in the evening, and participants who described themselves as "evening people" were more likely to rely on stereotyping in the morning. In both situations, the participants were being tested at a time of day when they were less alert and more cognitively depleted. This provides evidence that people may rely on stereotyping more when they are not at their cognitive fullest.

The finding that people stereotype more when cognitive resources are depleted supports the notion that stereotypes free up cognitive resources for other tasks. However, it is also possible that when people are under cognitive load, they may consciously or unconsciously use stereotypes more than when not under cognitive load. Macrae et al. (1994) directly tested whether using stereotypes freed up cognitive resources so people could pay attention to other tasks. Specifically, they had participants perform two tasks at the same time. Participants were shown the name of a person and various traits about that person (e.g., creative, sensitive). The traits were shown one at a time and the participants' task was to remember the traits. In one condition, participants saw only the person's name and the traits. In the second condition, participants were also told a stereotype label (e.g., artist) along with the name. The stereotype label was predicted to make the memory task easier, thereby freeing up cognitive resources for another task. To assess the participants' ability to engage in a secondary task, while learning the traits, participants were tasked with listening to the passage about Indonesia and remembering the facts presented. Consistent with their prediction, Macrae et al. (1994) found that participants who were shown the stereotype label performed better on a quiz about Indonesia. According to the researchers, the presence of the label helped in freeing up cognitive resources, so participants could better perform both tasks.

The research by Macrae et al. (1994) is widely cited and represents some of the only direct evidence showing that stereotypes might free up cognitive resources for secondary tasks. Recent studies have shown that, especially within the field of social psychology, a lot of results from older research studies do not replicate when tested again (Earp & Trafimow, 2015; Nosek et al., 2015). Whether this is due to the design of the original study, the replication's effectiveness, the changing attitudes and behaviors of participants between the years of execution, or something else entirely, the simple fact that replication tends to not yield the same results suggests the importance of it as a way of clarification and expanding the body of knowledge.

Furthermore, when examining the studies by Macrae et al. (1994), it becomes apparent that there are some potentially significant flaws. In the study I replicated, Macrae et al. had a sample size of only 24 participants, all of which were female. It is possible that Macrae et al.'s (1994) results could have been influenced by only examining female participants, and it is also possible that the findings could have shown an inflated discovery rate due to the low number of participants.

Because of the reasons presented above (i.e., the importance of the study but also the potential for methodological issues), I replicated Study 1 of Macrae et al.'s (1994) article. In addition to replicating the study, I also expanded upon their research by an additional condition. As a reminder, Macrae et al.'s study showed participants a label that was consistent with stereotypical traits (e.g., artist-creative) or no label. It is possible that the presence of any label, even if it was inconsistent with the stereotype (e.g., doctor-creative), could have aided participants' memory. Therefore, it could be that the improvement caused by the label was not because of stereotypes, but simply because a label (any label) was provided. To address this issue, I included a stereotype inconsistent label condition.

In my study, participants watched a video that showed names of people and numerous traits for each person. Participants were randomly assigned to also see either a label, a stereotype consistent label, or a stereotype inconsistent label. While seeing the names and traits, a passage was read about Indonesia. After watching the video, participants were tested on their memory of the traits associated with each person and then completed a quiz about Indonesia.

Despite the potential flaws of Macrae et al.'s (1994) study, and given the large body of indirect evidence that supports the theory that stereotypes can serve as a way to simplify cognitive processing, I hypothesized that (1) participants in the stereotype consistent label condition would perform the best on the trait recall task, followed by the stereotype inconsistent label condition and then the no label condition would perform the worst. I also hypothesized that (2) participants in the stereotype consistent label condition would perform the best on the quiz about Indonesia, followed by the stereotype inconsistent label condition and then the no label condition. Based on previous research, I believed that the presence of the stereotype consistent label would free up cognitive resources and allow for more attention on the passage being read, the stereotype inconsistent label would help marginally by providing a reference point, and the no label condition would provide no reference point to help the brain categorize the information presented, thus making the cognitive load overwhelming and leading to poorer performance.

Method

Participants

Participants were 165 undergraduate students (26.1% men, 73.3% women, .6% nonbinary) recruited at Appalachian State University through the Psychology Department Subject Pool (SONA). The average age of participants was 19.67 (SD = 2.24). Participants received course credit in exchange for completion of the study.

Design

The study's design was a modified version of Macrae et al.'s (1994) original. I added a third condition to discern if the presence of any label, even if inconsistent with stereotypes, would impact memory. Participants were randomly assigned to one of three conditions: stereotype consistent label, stereotype inconsistent label, or no label. The single factor (consistent label, inconsistent label, no label) was manipulated in a between-subjects design.

Procedure

Due to the inability to conduct the study in person because of COVID-19, participants completed an online survey on their individual devices. Upon starting the online survey, participants were first presented with a page containing the informed consent document. It explained that they would be shown information about people while simultaneously hearing a short passage and then asked questions about both the people and the passage. The page also clarified that participants would be asked about their age and gender and that the study would take approximately 20 minutes.

Following the consent form, participants were then presented with a page containing instructions about the study. The instructions defined the aim of the study as investigating people's ability to perform two tasks simultaneously. The instruction that the participant would be shown information about different people while listening to a passage was restated, and it was emphasized that they would be asked about both the people and the passage later in the study. This was done to ensure that participants were not prioritizing either the information about the people or the passage. The instructions also stated that the task would be difficult and that the participants should try their best. Participants were then asked if they were wearing headphones or had the ability to listen to the video aloud to ensure that they would hear the passage.

The participants were then presented with one of three two-minute videos, depending on their randomly assigned condition. All videos had a target's name (e.g. Nigel) and a descriptive personality trait (e.g. Caring). The names and traits were the same as those used in Macrae et al.'s (1994) research (see Table 1 for the names and traits). The name was presented at the top of the screen and the trait was presented at the bottom. There were four names in total, and participants were presented with one name at a time. Ten traits were presented with each name, with each trait presented for approximately 3 seconds, one at a time, until all 10 had been shown. After the 10 traits were shown for a given name, the screen briefly cleared before presenting the next name and coinciding traits. This process repeated until all four names and their respective ten traits each were shown.

Table 1

Stereotype Labels and Personality Traits for Impression-Formation Task

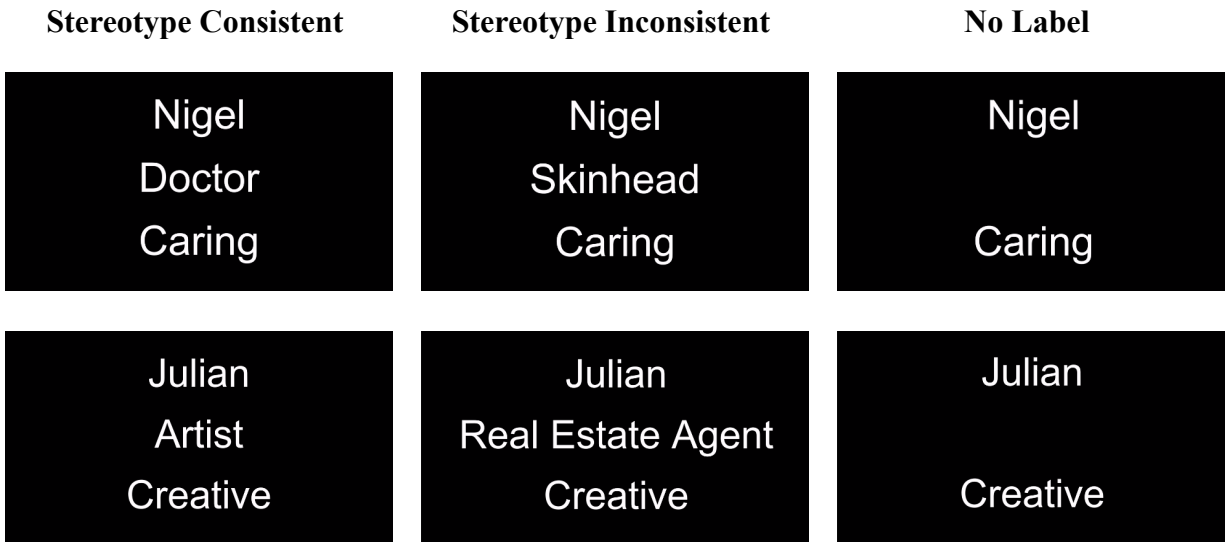
Name Stereotype Consistent Stereotype Inconsistent	**Nigel** doctor skinhead	**Julian** artist real estate agent	**John** skinhead doctor	**Graham** real estate agent artist
	Caring	*Creative*	*Rebellious*	*Pushy*
	Honest	*Temperamental*	*Aggressive*	*Talkative*
	Reliable	*Unconventional*	*Dishonest*	*Arrogant*
	Upstanding	*Sensitive*	*Untrustworthy*	*Confident*
	Responsible	*Individualistic*	*Dangerous*	*Unscrupulous*
	Unlucky	Fearless	Lucky	Musical
	Forgetful	Active	Observant	Pessimistic
	Passive	Cordial	Modest	Humorless
	Clumsy	Progressive	Optimistic	Alert
	Enthusiastic	Generous	Curious	Spirited

Note: Traits that are italicized are consistent with the stereotype consistent label.

Depending on participants' assigned condition, one additional piece of information was presented in the video, along with the name and trait (see Figure 1). For participants assigned to the consistent label condition, a stereotype label (e.g., Doctor) was presented at the center of the screen. This stereotype label corresponded to five of the ten traits presented (e.g. Nigel - Doctor - Caring). These five traits had been previously established as being consistent with the stereotype of the label (Macrae et al., 1994). Participants assigned to the inconsistent label condition also saw a label, but the label was inconsistent with the presented traits (e.g., Nigel - Skinhead - Caring). Participants in the no label condition were presented with only a name and traits with nothing in the center. The names and traits were presented in the same order for all participants. The only aspect that varied was the label presented with the names and traits.

Figure 1

Examples of the Name and Traits Displayed in the Three Conditions



In all three conditions, while the names and traits were being presented, an audio passage was read aloud about the geography and economy of Indonesia (see Appendix A). The subject matter of the passage was chosen because very few undergraduate students are knowledgeable about Indonesia (Macrae et al., 1994). The passage contained a variety of facts about Indonesia that were read as a narrative, rather than a list of unrelated statements.

After watching the video, participants were presented with a chart that had each of the four names (i.e., Nigel, Julian, John, and Graham) with 10 blank spaces under each name. The instructions clarified that the participants should try their best to assign what traits they could recall to the appropriate name. The participants were told they could type the traits in any order and they should not be concerned with spelling. After typing as many traits as they could remember, the participants proceeded to the task assessing their memory of the passage.

To examine memory of the passage about Indonesia, participants were presented with 20 multiple choice questions, shown one at a time (see Appendix B). Each question had four answer choices and directly corresponded to the facts presented verbally throughout the video. Participants then completed a task for an unrelated study, were asked about their age and gender, and were given credit for their participation.

Results

To test the hypothesis that participants' memory for the traits would be influenced by the stereotype label, the number of traits recalled by each participant was counted. Specifically, I had research assistants who were blind to the participants' condition count the traits. They were instructed to allow for misspellings (e.g., giving credit for responsable and confidant as misspellings of responsible and confident), but did not give credit for using synonyms (e.g., kind instead of caring). Two research assistants independently scored participants' memory for Nigel

and John, and two other research assistants independently scored Julian and Graham. I then looked for instances where the scores of the two RAs differed and resolved any discrepancies. Finally, I added up the number of correctly recalled traits across the four names for each participant.

I then ran a one-way ANOVA on the participants' memory of the personality traits. This analysis found that participants' quiz scores in the no label condition ($M = 5.75$, $SD = 6.37$), consistent label condition ($M = 4.55$, $SD = 6.46$), and inconsistent label condition ($M = 4.02$, $SD = 3.64$) were not significantly different from each other, $F(2, 162) = 1.31$, $p = .272$. This indicates that there was no significant difference in participants' memory of the personality traits depending on the presence of the stereotype label, which does not support my hypothesis that participants in the consistent label condition would perform the best. This is also inconsistent with the results of Macrae et al.'s (1994) study.

To test my second hypothesis, that participants' label condition would influence their score on the multiple choice task, I ran a one-way ANOVA on participants' multiple choice quiz scores (i.e., the number of questions correctly answered out of 20). This analysis found that participants' quiz scores in the no label condition ($M = 9.30$, $SD = 2.51$), consistent label condition ($M = 9.40$, $SD = 3.06$), and inconsistent label condition ($M = 9.26$, $SD = 2.44$) were not significantly different from each other, $F(2, 162) = 0.04$, $p = .963$. This indicates that there was no significant difference in participants' score on the multiple choice questions about Indonesia depending on the presence of the stereotype label, which does not support my hypothesis that participants in the consistent label condition would perform the best. This finding is also inconsistent with what Macrae et al. (1994) found in their studies.

As exploratory analyses, we examined whether the patterns described above (i.e., the lack of an effect of label condition on participants' trait recall and quiz scores) was similar for men and women. Analyses only including men or only including women showed similar effects. Specifically, whether analyzing all participants together, only men, or only women, participants' label condition did not influence their memory of the traits nor their performance on the multiple choice quiz.

Discussion

This study was intended to replicate and expand on Macrae et al.'s (1994) study to examine the impact of stereotypes on cognitive processing. According to the results of the highly cited original study, people under cognitive load can utilize stereotypes to ease that load and improve their performance on separate, unrelated tasks. In this case, participants were presented with names, traits, and stereotype labels while simultaneously listening to a passage about the geography and economy of Indonesia. They were then asked to recall as many traits as possible and answer a multiple choice test on the facts presented in the Indonesia passage. Macrae et al.'s study showed that participants who were presented with the stereotype label performed better on the trait recall and multiple choice portions, suggesting that the presence of the label helped to ease cognitive load and allow for better performance on the tasks.

I replicated Macrae et al.'s (1994) study using, when possible, their same procedures and materials. Furthermore, I added a new condition to test whether giving any label (even one inconsistent with the traits) could enhance participants' performance on the tasks. The results of my replication were not consistent with the original study. Specifically, I found no significant differences in memory performance on the trait recall task or the multiple choice task on the passage about Indonesia between participants who were and were not presented with the

additional stereotype label. These results suggest that stereotypes may not relieve cognitive load or provide any additional help when attempting to perform two tasks simultaneously.

There are a variety of potential reasons as to why the results of my study and the original study differed. As noted in the Introduction, it is possible that the reason the original study found the effect was due to some issues with the design and execution of their study. For example, the original study had a sample size of only 24 participants. It is possible that some of these participants were especially proficient in memory tasks, or some of them had prior knowledge of Indonesia's geography and economy. Even if there were only a few participants that fit those criteria, the small sample size meant that the results could be easily skewed by a few exceptional participants. In addition to the small sample size, the original study's participants were also all female. This is an issue because the results are not representative of the population as a whole, and, therefore, are not generalizable.

It is also possible that the reason for the differences in results between my study and the original study are due to the differences in how the studies were conducted. I did try to use materials and procedures that were the same or at least very similar to the original study. Some differences, however, were unavoidable. For example, my study was run online rather than in-person in a lab setting due to restrictions in place because of COVID-19. This meant that I was unable to control for extraneous factors such as the location participants completed the study. It is possible that the participants could have taken part in the study while in an environment with excessive background distractions. This could have made focusing on the tasks more challenging than they would have been in a lab setting, thus skewing their performance to be worse than it should have been. The tasks themselves were already particularly difficult, and the uncontrollability of how participants took part in the study and their surroundings may have

exacerbated that difficulty even further. Without control over participants' surrounding environment, I can not be sure that they were able to perform to the best of their ability despite the challenging nature of the tasks. However, this difference could also be beneficial to my study, as the unpredictability of the participants' surroundings may have increased my external validity. In a real life setting where people are trying to multitask and utilize stereotypes, they would not always have perfect focus and optimum conditions for concentration. Thus, participants partaking in the study in more true-to-life settings may have provided a more realistic portrayal of the effect of stereotypes on easing cognitive load.

A third possible explanation for the differences in the results of the studies has to do with the stereotype labels used in both studies. Considering that this replication was completed 27 years after the original study, it is possible that the stereotype labels I replicated exactly from the original study do not hold the same cultural definitions or connotations that they did in 1994. Some participants may have not been familiar with the term "skinhead," as it is not as commonly used as it was when the original study was conducted. This cultural difference could have impacted the participants' memory of the traits in the stereotype label condition because they would not associate the label with the traits presented.

Future research into the relationship between stereotypes and cognitive load should make a few adjustments to how our study was conducted. Firstly, the study should be run in an in-person lab setting to minimize the impact of environmental distractors on the participants. The study should also try to modernize the stereotype labels to ensure participants would have the correct associations with the label presented (e.g. change Skinhead to Thug or Delinquent). Given the difficulty of the study's tasks, it may also be beneficial to simplify them. In Macrae et al.'s (1994) study, the researchers included 10 traits with only five that corresponded to the

stereotype label. This was because the researchers wanted to observe if participants would remember the traits that corresponded to the label more frequently than the ones that did not. However, when only testing the benefit of stereotyping when under cognitive load, those five extra traits are unnecessary. Future research could eliminate the extra traits, thus making the task easier by having only 20 traits to remember instead of 40 and making all the traits align with the presented stereotype label.

Despite the limitations of my study and the need for future research, my results do not support the conclusion that stereotypes can free up cognitive resources. It is, therefore, possible that stereotypes do not have any beneficial effects as Macrae et al. (1994) suggested. It is also possible that stereotypes do have some beneficial effects, but not those suggested by Macrae et al. Specifically, stereotypes may help in social contexts when forming relationships and empathetically approaching conversations. Stereotypes allow for easier categorization and impression formation, but their usefulness may go beyond an initial impression. For example, if you had a stereotype label of "single working mother" that allowed you to categorize someone, you can make guesses about her situation and the aspects of life she may be dealing with. She is probably stressed out from work, tired from taking care of her children, and she may be looking for childcare options for while she is at work, among other things. When interacting with her, you could use the stereotype label to assume useful information about her to help facilitate your conversations. Thus, stereotyping may ease social confusion and allow for better communication.

My study, although far from conclusive, should still decrease our confidence that the research by Macrae et al. (1994) can be replicated. As noted earlier, Macrae et al.'s research is widely cited, but the exact results of their studies have not been replicated. At this point, it is impossible to pinpoint the exact reason that my study did not show the same results. It is,

therefore, important to run replications to expand the general body of knowledge within the field of social psychology. Furthermore, this study has led to more intriguing questions about whether or not stereotyping is actually beneficial to relieving cognitive load.

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Appendix A

Indonesia is a country made up of over 17,000 islands. The largest and most populated island is Java. Indonesia's capital city is Jakarta and has a population of over 10 million people. Indonesia's rivers serve as communication and transport links between the island's river settlements. Indonesia is a transcontinental country with parts of it being considered to exist in Asia and others in Australia. Many of the islands in Indonesia are known for their high volcanic activity. Because Indonesia is close to the equator, its climate is relatively even year-round and does not have extreme summers or winters. That being said, it does have a wet and dry season. Interestingly, monsoons are common year round in Indonesia.

Like many other countries, Indonesia is facing serious environmental issues including large-scale deforestation, overexploitation of marine resources, and air pollution. Indonesia is also projected to be at severe risk because of the effects of climate change.

Indonesia has the largest economy in southeast Asia and is classified as a newly industrialized, upper-middle income country. Unfortunately, corruption in the public institutions have historically caused problems for Indonesia's economy. In the past, the economy relied heavily on agriculture, although that is quickly changing. Indonesia has a number of abundant natural resources like oil, coal, tin, copper and gold. Indonesia's largest agricultural resource is palm oil. In fact, it provides roughly half the entire world's supply of palm oil. In addition to palm oil, coal is the leading export commodity. China and the United States are two major import partners with Indonesia.

Appendix B

1. Indonesia is made up of approximately _____ islands.
    a. 1,500
    b. 1,700
    c. 15,000
    d. 17,000

2. The largest island in Indonesia is _____ ?
    a. Java
    b. Jakarta
    c. Bandung
    d. Juanto

3. The population of Jakarta is approximately _____ people?
    a. 1 million
    b. 5 million
    c. 10 million
    d. 50 million

4. Indonesian islands are located in which continent(s)?
    a. Asia
    b. Africa
    c. Africa and Asia
    d. Asia and Australia

5. Indonesia's rivers serve as _____?
    a. Irrigation for agriculture
    b. Tourist spots for leisure activities such as swimming and boating
    c. Communication and transport links between the island's river settlements
    d. Providers of electricity through hydroelectric dams

6. Indonesia's volcanic activity can be described as _____.
    a. High
    b. Average
    c. Rare
    d. Nonexistent

7. Indonesia's climate _____ year-round.
    a. Varies significantly
    b. Fluctuates between extreme temperatures in the summer and winter
    c. Is relatively even
    d. Is one of the hottest places on Earth

8. Indonesia has _____.
    a. A wet and dry season
    b. Only a wet season
    c. Only a dry season
    d. Different fluctuations in seasons depending on the year

9. What weather event is common year-round in Indonesia?
    a. Hurricanes
    b. Monsoons
    c. Floods
    d. Tornados

10. Which of the following was mentioned as a serious environmental issue that Indonesia is facing?
    a. Biodiversity loss
    b. Overexploitation of marine resources
    c. Plastic Pollution
    d. Water Insecurity

11. Indonesia is projected to be at _____ risk due to climate change.
    a. Low
    b. Moderate
    c. Severe
    d. Extreme

12. Indonesia has the largest economy in _____.
    a. Southeast Asia
    b. The Pacific islands
    c. The eastern hemisphere
    d. The southern hemisphere

13. Indonesia is classified as a _____ country.
    a. Non-industrialized
    b. Newly industrialized
    c. Developing
    d. Underdeveloped

14. What has historically caused problems for Indonesia's economy?
    a. Scarcity of resources
    b. Poor trade relations
    c. Corruption in public institutions
    d. Wars with neighboring countries

15. In the past, Indonesia's economy relied heavily on _____.
    a. Motor vehicle exports
    b. Agriculture
    c. Pharmaceuticals
    d. Production of steel

16. Indonesia's natural resources are _____.
    a. **Abundant**
    b. Average
    c. Scarce
    d. Nearly nonexistent

17. Which of the following is one of Indonesia's natural resources?
    a. Salt
    b. Lumber
    c. Gold
    d. Diamonds

18. Indonesia's largest agricultural resource is _____.
    a. Soybeans
    b. Wheat
    c. Tobacco
    d. Palm oil

19. Indonesia's leading export commodity is _____.
    a. Corn
    b. Oil
    c. Coal
    d. Tin

20. Which two countries are major import partners with Indonesia?
    a. China and the United States
    b. Australia and Japan
    c. China and the Philippines
    d. The United States and the Philippines