

# Impact of Feedback on Intrinsic Motivation and Persistence in Generation Z

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Raguž, Nina

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# **Impact of Feedback on Intrinsic Motivation and Persistence in Generation Z**

Nina Raguž

Hospitality and Tourism Management, RIT Croatia

HSPT 489: Hospitality Project Planning & Development

Instructor: prof. Rebecca Charry

Mentor: prof. Vanda Bazdan

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## **Abstract**

Generation Z is the biggest upcoming workforce in the business world. Yet, their characteristic, attributes and work style preferences are still not researched enough. The aim of this paper is to investigate further the relationship between performance feedback and generation Z's internal motivation. The impact of different types of feedback was observed through an experiment, based on the Al Hirschfeld hidden-word drawings. Experiment was divided into three feedback type groups: positive, negative and non-existent feedback group. There was a total of 60 participants, the average age of participant was 20, age 17 being the youngest and 26 the oldest. Results show that there is no significant impact of feedback on generation Z's motivation. Furthermore, generation Z tends to connect closely their task enjoyment and interest with their own task-accomplishment. Implications for supervisors (employers, teachers, parents) of generation Z involve providing interesting and facile tasks in order to keep them motivated and interested.

*Keywords:* Generation Z, Internal Motivation, Task Persistence, Feedback

## **Impact of Feedback on Intrinsic Motivation and Persistence in Generation Z**

The source, aim, and amount of motivation varies hugely for each individual. As explored by Ryan and Deci (2000.), the type of motivation is closely connected with the attitudes and goals of an individual that encourage him/her to act. One employee might find in his job both inner satisfaction and reward, while another one performs for the sake of a salary. Because of these different types of motivation driven by different reasons and goals, motivation can be characterized as either an intrinsic or extrinsic one. During thorough research, it has been recognized that the quality of performance and experience differs when a person was moved by intrinsic or extrinsic reasons.

The new incoming workforce generation Z's workplace characteristics and preferences are still to be determined (Singh & Dangmei, 2016). By determining their needs, companies can prepare themselves better on recruiting them and, finally, retaining them. Retaining quality workforce has always been one of the most important tasks of human resources department in each industry. While the common turnover rate in most industries is 10-15%, the latest research has shown that the turnover rate in hospitality industry is close to 70-80% (Garcia, 2022). This paper examines to which extent one's motivation and task persistence are influenced by feedback, more specifically on generation Z's intrinsic motivation.

### **Delineation of Motivation Types**

According to Ryan and Deci (2000), motivation is a process by which one is motivated to act in particular way to reach a specific goal. A motivated individual feels compelled to do some action. An individual which does not have any interest is usually perceived as an unmotivated individual. As explored by many researchers, the amount and type of motivation is variable for each individual. The type, or orientation, of motivation is connected with the attitudes and goals of an individual that encourage him/her to act. To bring this theory even

closer, an example of student who is learning to play piano can be used. The source of student's motivation to learn this skill might be out of interest, pleasure, a desire for self-improvement or for teacher's or parent's approval. Furthermore, student can be motivated to improve because he/she wants to achieve a good grade or get a chance to perform at a concert. In all of these examples of motivation the focus, source and nature of it varies hugely.

Although there are different types of motivation driven by different reasons and goals, in self-determination theory [SDT], intrinsic and extrinsic motivation have been recognized as two general types. During thorough research, it has been recognized that the quality of performance and experience differs whether a person was moved by intrinsic or extrinsic reasons. It is believed that intrinsically motivated task leads an individual to enjoyment, while extrinsically motivated one to outside incentive primarily. (Deci & Ryan, 1985, as cited in Ryan & Deci, 2000).

### **Intrinsic Motivation**

Individual's intrinsic motivation is driven by the internal reasons, attributes and goals. Actions connected with internal motivation are always driven mainly by internal rewards. The individual's internal satisfaction of the behavior is greater than the desire for external reward, such as prize, money or recognition (Cherry, 2022).

As explored by White (1959), this kind of motivation was first recognized during an animal behavior experiment. It has been established that numerous animals willing fully explore, play and are curious without any rewards included. As stated by White, "Cats are reputedly killed by curiosity, dogs characteristically make a thorough search of their surroundings, and monkeys and chimpanzees have always impressed observers as being ceaseless investigators". This motivational tendency is imprinted in humans since their birth.

Throughout the life, motivation becomes a key element of self-development in both knowledge and skills.

The three main elements of intrinsic motivation have been recognized as autonomy, purpose and mastery (Pink, 2009, as cited by Cherry, 2022). As recognized in numerous cases, one is intrinsically motivated when he/she can act independently, feel useful or improve certain skill. However, it is important to note that acts driven by intrinsic motivation come with their own internal rewards. These rewards include positive emotions, higher self-satisfaction or a sense of self-progress.

Malone and Leeper (1987) identified challenge, control, cooperation, competition and curiosity as main factors which can increase one's intrinsic motivation.

Deci's and Ryan's Cognitive Evaluation Theory [CET], a sub theory of SDT, establishes main factors which produce variability in this type of motivation. CET claims that interpersonal acts, such as rewards, communications, feedback, which are directed to feelings of capability, increase individual's intrinsic motivation (Ryan & Deci, 2000). These interpersonal practices allow personal fulfillment of the basic psychological need for competence. CET furthermore establishes that intrinsic motivation can be enhanced by feelings of competence only when accompanied with the sense of autonomy. As Ryan and Deci stated, on the other side, there are interpersonal acts, such as threats, deadlines, directives and competition pressure, can reduce the amount of intrinsic motivation, since people perceive them as behavior controllers. For example, when parents provide their child autonomy support, a child is more prone to spontaneously seek and improve their knowledge, rather than a child which is under more control. (Grolnick, Deci & Ryan, 1997 as cited in Ryan & Deci, 2000).

## **Extrinsic Motivation**

Unlike intrinsic motivation, behavior driven by the extrinsic motivation is focused entirely on the earning external reward or avoiding punishment (Cherry, 2022). These types of rewards can be either tangible, like money, grades, prizes, awards, or intangible, such as praise, recognition, fame. While in intrinsic motivation one can get both internal satisfaction and reward, extrinsic one can come with only one benefit, reward. If one's behavior is extrinsically motivated, one will continue to perform it even though internal satisfaction is inexistent. Employees performing a job task which they do not find enjoyable, but they do it for paycheck, is the most common example of this. Extrinsic motivation does not necessarily need to be a bad thing. Usage of external rewards can be extremely effective tool in motivating one, especially if an individual is uninterested or lacks skill to start the task. Extrinsic motivating is used in numerous areas. From workplace, parenting to education, offering extrinsic rewards has shown as a great motivating tool.

## **Types of Feedback**

Van de Ridder et al. (2008) define feedback as a “specific information about the comparison between a trainee's observed performance and a standard, given the intent to improve the trainee's performance”. Feedback is usually categorized as either positive or negative, as though it's a matter of simple and exclusive contrast. However, numerous other types of feedback categorization can be recognized. Written or spoken, formal or informal, positive or negative, constructive or destructive feedback is something that exists in each interpersonal relationship. Even non-existent feedback has its own impact as the controlling source of the action.

Based on the environment, sources and types of feedback can be divided even further (Geraghty, 2017). If we observe types of feedback in a workplace it may be provided to an individual from his/her peers, employees, managers or customers. Feedback can come in many different types; it can be shared in as constructive feedback or it can come in a form of a praise or criticism. Constructive type of a feedback focuses on an area for improvement, and is solely based on observations. Constructive feedback can be further divided into negative feedback, positive feedback, negative feedforward and positive feedforward. All of these types of feedback offer corrective comments towards the previous work behavior. As an addition to that, feedforward ones also point out the behavior that should be avoided or continued in the future. While constructive feedback is mostly focused on information, praise focuses on the person itself. An employee that receives the praise usually has enhanced self-esteem and boost in confidence. On the other side, criticism is a negative statement, judgment about the person and its previous behavior. This type of feedback is often advised to be avoided since it can be destructive and ineffective in improving the work attitude, motivation and performance.

According to Jung Kim and Ryong Lee (2019), feedback represents the fundamental role in performance training. Since feedback does have an impact on recipient, it can yield with either positive or negative emotional reactions, as well as enhanced or diminished motivation. Furthermore, in conducted research it was established that verbal feedback has an impact on one's self-efficacy, emotional response and self-assessment.

Numerous studies have actually revealed that positive performance feedback can enhance intrinsic motivation whereas, negative feedback reduces it (Deci, 1971; Harackiewicz, 1979, as cited in Ryan & Deci, 2000).



## **Generation Z Work Preferences and Characteristics**

A generation which was born in the 1990's and brought up in 2000's (Singh & Dangmei, 2016). This generation was the first one to be born and raised with the new changes of technology, such as internet, smart phones, laptops, etc. They are commonly specified as Gen, Tech, Gen Wii, Zoomers, Digital natives. Zoomers will soon be entering into business world and there is still not enough information about generation's needs, attributes, characteristic and work style. Since their childhood was significantly different from previous generations, it can be concluded that their characteristics and preferences also differ. Without the needed understanding of the generation Z, new big workforce, organizations will have a difficult time in recruiting, satisfying and retaining them. As reported by the Institute for Emerging Issues (2012), this generation is the most technologically sophisticated and ethnically diverse generation. As established so far, generation Z has a preference toward individual and direct way communicating. Zoomers find social networking as a vital part, yet they are still a self-reliant generation.

According to Schwabel (2014), generation Z is more entrepreneurial, tolerant and reliable. Zoomers are also described as environmentally aware and politically progressive generation. Regarding the work preferences, they are less motivated by money than millennials, optimistic about future yet still realistic.

Nevertheless, generation Z also has some weak characteristics. According to Coombs (2013), this generation lacks problem-solving skills. Up until now, this generation wasn't as successful in showcasing their ability to observe and analyze the situation, and find the best solution.

It has also been found that generation Z has a high dependency on technology and low attention span (Makboul et al., 2021). This generation is likely to be quick minded, demanding

and individualistic. Zoomers are also more focused on the personal development, rather than on the altruism mindset.

As stated by Basha (2011), generation Z prefers flexibility, personal freedom and autonomy and transparency in a workplace. The attempt of forcing generation Z into adapting to the traditional work setting, could have a consequence of frustration, low morale and job commitment.

### ***Original experiment***

Experiment was based on an already conducted study of the impact of controlling and informative rewards on intrinsic motivation: “Control and Information in the Interpersonal Sphere: An Extension of Cognitive Evaluation Theory” (Ryan, 1982). The original experiment consisted of 128 psychology students, with the equal number of each gender. The experiment was based on a hidden word puzzle, drawn by the caricaturist Al Hirschfeld. After the birth of his daughter, Al Hirschfeld disguised cleverly numerous *NINA*'s into his drawings (Figure 1). This study examined the difference and impact of self-administered versus interpersonal feedback, as well as informational versus controlling type of feedback. The increase in intrinsic motivation was identified once informational feedback was provided.

## Methodology

An experiment was based on an already conducted study of the impact of controlling and informative rewards on intrinsic motivation: “Control and Information in the Interpersonal Sphere: An Extension of Cognitive Evaluation Theory” (Ryan, 1982). This altered experiment reviewed following hypotheses:

H1: *Negative feedback [NF] undermines intrinsic motivation and task persistence*

H2: *Positive feedback [PF] enhances intrinsic motivation and task persistence*

H3: *Non-existent feedback [NEF] undermines intrinsic motivation and task persistence*

### *Modified experiment*

The procedure of experiment was altered to conform the chosen site, available equipment, research topic and participants. Unlike the original experiment, this one’s focus is solely on the impact of positive, negative and non-existent feedback on intrinsic motivation.

The modified experiment was divided into two phases. In the first phase participants were introduced with the puzzle in front of them and questioned their familiarity of it. During the rest of the phase one, participants were solving the given puzzles.

After finishing the given puzzles and provided feedback, experimenter leaves the room with the excuse to compile their given data and results. Participants are then left in the room with a few remaining unsolved puzzles and a popular magazine. Throughout this period, the time spent working on other puzzles was recorded, to establish the behavior of their intrinsic motivation and task persistence. The observer in the original experiment had a window with curtains, which gave an opportunity of unnoticed observation. In this experiment, due to lack of facilities, experimenter’s assistant was left in the room with participants to record their behavior.

### *Participants*

Since the aim of this paper is to examine the behavior of generation Z, the participants of the experiment were students. The average age of participant in all three groups was 20 years old, age 17 being the youngest and 26 the oldest (Table 2). Participants were divided into three groups, each group contained twenty students in total. The first group received negative feedback, positive feedback was provided to second group and the third group did not receive any type of feedback. Experiment had 60 participants in total, out of which each feedback group contained 20 participants. There were 22 (36,7%) female participants and 38 (63,3%) male participants. More specifically, the majority of male participants were assigned to positive feedback group (70%) and negative feedback group (80%). In the non-existent feedback group majority of participants were female (60%), (Table 1).

### *Apparatus and Materials*

The main element of this experiment was a hidden-figure puzzle drawings by Al Hirschfeld (Figure 1). After finishing each puzzle set, students filled out the puzzle questionnaire. This questionnaire explored participants' rate of interest, enjoyment of puzzles, quality, challenge of puzzle and worthwhileness on a 10-point scale (Figure 4). Participants also answered to a few demographic questions (gender, age, program, place of residence) in the first puzzle questionnaire. During the second phase, students were left with three unsolved puzzles, a current popular magazine and possibility to use mobile phone.

### *Experimental Procedure*

Upon arrival to the RIT classroom, Dubrovnik campus, students were seated at their assigned places. In order to avoid the influence of others, each student was separated for approximately five meters from others. Experimenter explained briefly the process and phases

of the experiment. Students were then provided with the folder which contained the puzzles and questionnaires. Each puzzle was connected with its questionnaire with a paperclip. In order to get a better understanding of the task, students were given two minutes to work on the sample puzzle drawing (Figure 2). After those two minutes, subjects were required to assess their familiarity of this puzzle type, as well as their interest and enjoyment. In addition to these questions, participants have also answered to a few demographic questions. Through this questionnaire, students' initial interest for this figure task was measured. The puzzles and questionnaires were then collected by experimenter and students continued to solve the rest of the hidden-figure puzzle drawing by Al Hirschfeld. Each participant within the group was required to write down their assigned number on each paper. This way experimenter was able to gather the correct overall data and results of each participant.

During this first experiment phase, students were given three sets of drawings followed with questionnaires. Through these questionnaires students were able to assess how challenging and interesting the puzzle was for them. The first puzzle was sample puzzle, with which participants got acquainted with the task itself. Experiment then continued with the puzzle 1 and puzzle 2. All groups of students, regardless of the type of feedback provided, were given two minutes for each hidden-figure puzzle drawing. During this time participants circled with a pen each *Nina* that they could find. After the completion of first and second set puzzle and questionnaire, they were provided with performance feedback. Since feedback was not provided during the solving of sample and first puzzle, they belong in the "pre-test", while the data from the second puzzle are the "post-test" results. Students' performance (number of found *Ninas*) was compared with the average puzzle performance and maximum possible performance. However, the average and maximum number was adapted to the type of feedback group (negative/positive/non-existent). In this way, participants got different types of feedback which was aimed toward specific "success" direction. To the group which was provided with

negative feedback, the maximum number of *Ninas* that could be found was refined as slightly higher, in order to avoid the perfect scores. The average performance score was also set higher than the usual. On the other side, the group which was provided with positive feedback, the average score was set lower than usual. The PF (positive feedback) group of students was also provided with the praise and encouragement, while NF (negative feedback) group was criticized and discouraged through subtle ways. The NEF (non-existent feedback) group, did not receive any feedback on their performance. Examples of feedback provided:

*Positive feedback:* (a) “That’s much better than the average.” (b) “You did great” (c) “You are one a few who found this many *Nina*’s”

*Negative feedback:* (a) “Although you did find some *Nina*’s, this is below the average.” (b) “Up until now everyone has been able to find them all.” (c) “This is the lowest number that anyone has found.”

*Non-existent feedback:* “Here is your next puzzle.”

After finishing two sets of puzzles, phase two could begin, participants were told that they are done with puzzle solving. The experimenter announces its upcoming short absence, with the excuse of compiling the data provided from their questionnaires. After leaving the room, experimenter’s assistant is left in the room, to observe participants’ behavior. Students are left with three unsolved puzzle drawings, a current popular magazine and possibility to use their mobile phone. During this three-minute free-choice period, students’ behavior was observed and recorded. The choice of whether they would continue solving the remaining puzzles was used as a measure of participants’ intrinsic motivation, like in many previous studies alike. After the absence of three minutes, experimenter goes back to the room and the experiment comes to an end.

## Results

The impact of different types of feedback was tested by ANOVA analysis and Pearson correlations.

### *Differences in Performance*

The only significant difference between the feedback groups in the pre-test puzzles has been noticed in the sample puzzle,  $F(2,57)=5.241$ ,  $p=.008$  (Table 3). Between the three groups, positive feedback group was actually the one which has found the most *NINA*'s ( $M=2.0$ ,  $SD=.00$ ), while negative feedback ( $M=1.60$ ,  $SD=.50$ ) and non-existent feedback group ( $M=1.60$ ,  $SD=.60$ ) found the same amount. No effect was recorded for the second pre-test puzzle. Interestingly, there was no effect of feedback on performance in the post-test puzzle,  $F(2,57)=0.282$ ,  $p=.755$  (Table 10). This result suggests that the type of feedback received did not impact their performance, which disproves hypotheses presented in this study.

### *Differences in Persistence*

Impact of feedback on intrinsic motivation was further on analyzed during the free choice period, which also showed no significant difference  $F(2,57)=1.242$ ,  $p=.297$  (Table 6). Once the participants were left with a choice to return to the task or to turn to other distractors (magazine and mobile phone), all of them continue with the task. There was only one exception, a participant from the positive feedback group, who chose to scroll through the magazine during the free-choice period. However, since it was only one out of twenty participants of that group, it can be concluded that it is not significant.

### *Differences in Ratings*

Within different types of groups, there has been some significant difference recorded in the number of found *NINA*'s and the rate of "enjoyment",  $F(2,57)=5.289$ ,  $p=.005$ . Non-existent feedback group has rated their enjoyment the highest ( $M=7.45$ ,  $SD=.44$ ), even

though positive feedback group was actually the one with the most success in the task ( $M=2.0, SD=.00$ ). Still, positive feedback group ranked their “enjoyment” second the highest ( $M=6.95, SD=.50$ ), (Table 4). In between other rankings there have been no significant differences. In the second pre-test puzzle, there was no significant difference in participants results and rankings. The following ANOVA analysis of the post-test puzzles also didn’t show any significant difference between the feedback groups  $F(2,57)=0.282, p=.755$  (Table 5). These results bring to conclusion that there was no significant impact of feedback.

#### *Impact of Performance on Ratings*

Further correlations also confirmed that feedback had no significant impact, but the task itself did. If participants found the pre-test puzzle “challenging”, they would also rate post-test puzzle as “challenging” as well (Table 7). There was a significant correlation found in free-choice puzzles and score in post-test puzzle ( $r=.28, p=.03$ ), (Table 8). Which suggest that if their performance was good in the post-test puzzle, they would be more motivated to perform well in the free-choice puzzles as well. Even though feedback had no impact, some statistically significant correlation was recorded between the overall score and rate of “enjoyable” ( $r=.35, p=.01$ ) and “interesting” ( $r=.33, p=.01$ ), (Table 9). Signifying that if they performed well in the task, they would then find it more enjoyable and interesting

### **Discussion**

This study examines the level of impact of different kinds of feedback on intrinsic motivation and persistence in generation Z. This generation’s characteristics and preferences have still not been researched thoroughly enough, even though they are the biggest upcoming workforce in the business world (Singh & Dangemi, 2016). It is assumed that their characteristics and preferences differ from other generations, since their childhood itself differs from others quite a lot. Without the proper understanding of their needs and preferences,



companies might have a difficult time in recruiting, satisfying and retaining them, while professors and parents may struggle to keep them interested and motivated.

Therefore, this paper gives a deeper look into generation Z's motivation and persistence, once encountered with the performance feedback. In order to obtain this data, an experiment was carried out. The experiment's participants were solving a set of hidden-word puzzle drawings by Al Hirschfeld, after which they would receive performance feedback. The experiment was constructed of three groups: positive feedback, negative feedback and non-existent feedback group.

The results derived from this experiment suggest that there is no significant impact of feedback on generation Z. Whether it was a positive, negative or non-existent feedback, there has not been found any significant difference in their further motivation nor persistence.

Furthermore, this experiment has confirmed everything that is known about this generation, so far. Generation Z is known as a highly demanding and individualistic generation, with a high focus on personal development (Makboul et al., 2021). These characteristics could be noticed in the results; a highly individualistic and self-reliant person could not be easily impacted and controlled by extrinsic tools, such as feedback. Focus on the personal development can be seen in the close connection of their overall performance score and the rate of their enjoyment and interest in the task. Out of this data, it can be concluded that generation Z strives for the sense of self-accomplishment and self-competence. Without those elements, this generation can find it difficult to have an interest or enjoyment in the task.

As the results suggest that feedback has not impacted participants' motivation and persistence, it can be concluded that this task was an intrinsically interesting activity. Since this generation's characteristics and preferences have still not been researched thoroughly enough, for some further research, it would be interesting to observe how they would behave

with a more complex task. By facing such a task, the impact of feedback would perhaps grasp some significance. Some additional suggestions for further research would be to increase the number of participants, as well as inclusion of other generations. This kind of data would provide a better understanding of generation Z and a comparison to other generations' behavior. Another interesting area, worth of exploring, would be the connection between their sense of accomplishment with intrinsic motivation.

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## Tables

Table 1

*Frequency table for gender for feedback groups*

<b>Positive Feedback - Gender</b>			
Category	Frequency	Percent	Cumulative Percent
Male	14	70.0	70.0
Female	6	30.0	100.0
Total	20	100.0	

<b>Negative Feedback - Gender</b>			
Category	Frequency	Percent	Cumulative Percent
Male	16	80.0	80.0
Female	4	20.0	100.0
Total	20	100.0	

<b>Non-Existent Feedback - Gender</b>			
Category	Frequency	Percent	Cumulative Percent
Male	8	40.0	40.0
Female	12	60.0	100.0
Total	20	100.0	

Table 2

*Descriptive statistics for age for feedback groups*

<b>Positive Feedback - Age</b>					
Category	N	Minimum	Maximum	Mean	Std. Deviation
Age	20	18	26	21.35	2.110
Valid N	20				

<b>Negative Feedback - Age</b>					
Category	N	Minimum	Maximum	Mean	Std. Deviation
Age	20	17	22	19.35	1.226
Valid N	20				

<b>Non-existent Feedback - Age</b>					
Category	N	Minimum	Maximum	Mean	Std. Deviation
Age	20	18	26	20.60	1.875
Valid N	20				

Table 3

*Descriptive statistics for means for all feedback groups for task performance*

<b>Pre-test – performance score</b>			
	Mean	Std. Deviation	F
Positive Feedback	2.00	0.000	5.241**
Negative Feedback	1.60	0.503	
Non-existent Feedback	1.60	0.598	
Total	1.73	0.482	

*Note.* \*\*  $p=.008$

Table 4

*Descriptive statistics for means for all feedback groups for enjoyment rate*

<b>Puzzle enjoyment rate</b>			
	Mean	Std. Deviation	F
Positive Feedback	6.95	2.235	5.289**
Negative Feedback	5.10	2.634	
Non-existent Feedback	7.45	1.959	
Total	6.50	2.474	

*Note. \*\*  $p=.005$*



Table 5

*ANOVA descriptive statistics for means for all feedback groups performance and ratings in the post-test*

		<b>Post-test puzzle</b>				
		N	Mean	Std. Deviation	F	Sig.
Puzzle 2	PF	20	3.50	1.606	0.282	0.755
	NF	20	3.80	1.361		
	NEF	20	3.50	1.395		
	Total	60	3.60	1.440		
Enjoyable	PF	20	7.50	2.065	0.529	0.592
	NF	20	7.05	3.052		
	NEF	20	7.85	2.159		
	Total	60	7.47	2.446		
Good	PF	20	7.10	2.024	0.395	0.675
	NF	20	7.15	2.455		
	NEF	20	7.65	1.981		
	Total	60	7.30	2.142		
Interesting	PF	20	7.05	2.438	1.514	0.229
	NF	20	7.55	2.460		
	NEF	20	8.30	1.922		
	Total	60	7.63	2.307		
Exciting	PF	20	6.70	2.130	0.565	0.571
	NF	20	6.80	2.707		
	NEF	20	7.45	2.395		
	Total	60	6.98	2.404		
Challenging	PF	20	8.20	1.436	0.616	0.544
	NF	20	7.65	2.300		
	NEF	20	7.55	2.139		
	Total	60	7.80	1.981		
Worthwhile	PF	20	6.30	2.697	0.657	0.522
	NF	20	6.75	2.731		
	NEF	20	7.25	2.425		
	Total	60	6.77	2.606		
Encouraging	PF	20	6.00	2.734	0.917	0.406
	NF	20	6.15	2.961		
	NEF	20	7.10	2.654		
	Total	60	6.42	2.782		

*Note.* No test was statistically significant ( $p > .05$ )

Table 6

*ANOVA descriptive statistics for free choice puzzles*

<b>Free choice puzzles</b>					
	N	Mean	Std. Deviation	F	Sig.
Positive Feedback	20	4.10	2.024	1.242	0.297
Negative Feedback	20	3.90	1.447		
Non-existent Feedback	20	4.75	1.832		
Total	60	4.25	1.791		

*Note.* No test was statistically significant ( $p > .05$ )

Table 7

*Correlation statistics for pre-test and post-test rate of “challenging”*

		<b>Correlations</b>	
		Challenging 1	Challenging 2
	Pearson Correlation	1	,553**
CH1	Sig. (2-tailed)		0,000
	N	60	60
	Pearson Correlation	,553**	1
CH2	Sig. (2-tailed)	0,000	
	N	60	60

Table 8

*Correlation statistics for free-choice and post-test puzzle*

<b>Correlations</b>		
	Free choice	Puzzle 2
	1	,283*
Pearson Correlation		
FCH Sig. (2-tailed)		0,029
N	60	60
	,283*	1
Pearson Correlation		
P2 Sig. (2-tailed)	0,029	
N	60	60

Table 9

*Correlation statistics for “Overall Score”, “Enjoyable” and “Interesting”*

		<b>Correlations</b>		
		Overall Score	Enjoyable	Interesting
	Pearson Correlation	1	,350*	,327*
OS	Sig. (2-tailed)		0,006	0,011
	N	60	60	60
	Pearson Correlation	,350*	1	,832**
Enj	Sig. (2-tailed)	0,006		0,000
	N	60	60	60
	Pearson Correlation	,327*	,832**	1
Int	Sig. (2-tailed)	0,011	0,000	
	N	60	60	60

Table 10

*ANOVA descriptive statistics for post-test puzzle*

<b>Post-test puzzle</b>					
	N	Mean	Std. Deviation	F	Sig.
Positive Feedback	20	3.50	1.606	0.282	0.755
Negative Feedback	20	3.80	1.361		
Non-existent Feedback	20	3.50	1.395		
Total	60	3.60	1.440		

*Note.* No test was statistically significant ( $p > .05$ )

## **Figure Captions**

*Figure 1. Example of Al Hirschfeld's drawing*

*Figure 2. Sample hidden-figure puzzle drawing*

*Figure 3. Experiment Protocol*

*Figure 4. Questionnaire*

*Figure 1. Example of Al Hirschfeld's drawing*



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*Figure 2. Sample hidden-figure puzzle drawing*



### *Figure 3. Experiment Protocol*

This experiment will be based on an existing experiment “Control and Information in the Interpersonal Sphere: An Extension of Cognitive Evaluation Theory”, conducted by Richard Ryan. Experiment will be carried out through three groups, consisting of 20 participants per each group. The whole experiment will last up to maximum of 60 minutes, 20 minutes per group.

Upon arrival, participants will be welcomed and guided by an experiment moderator. Participants will be guided to their seating arrangement. Each student will be separated from each other for approximately five meters. Participants will then be given further instruction on the experiment.

Introduction (2 minutes)

**Moderator:** “Hello everyone! I am currently obtaining data for my senior project. I’d like to first express my gratitude for your participation in this experiment. Your contribution today will be extremely useful in recording the results needed for the rest of my senior project.”

I would like to point out some guidelines that need to be followed during this experiment.

1. This experiment will last 20 minutes.
2. It is divided into two phases. In order to get acquainted with this type of puzzle you will first have some time to work on a sample puzzle-drawing. After the sample puzzle we will move onto the more challenging same type of puzzle-drawings.
3. Please take in consideration that no interaction of any kind is allowed between the experiment participants.
4. Usage of mobile phones is not permitted during the experiment.
5. The puzzle-drawings which you will be solving are from the famous caricaturist Al Hirschfeld, who has cleverly hidden his daughter’s name *NINA* in numerous works. Your task

is to find as many *Ninas* in a drawing as you can, and circle it. You will be given two minutes to get acquainted with it. After this time finishes, please answer to the attached questionnaire.

6. After you finish the puzzle and questionnaire, please remain seated and wait for further instructions.

After the solving sample puzzle drawing time is completed:

1. During the rest of the experiment, the puzzles you will continue to work on are also from the famous caricaturist Al Hirschfeld.

2. You will solve puzzles one at a time, for each you get two minutes. After these two minutes pass, please focus on the puzzle questionnaire, located on the second paper, attached to the puzzle.

3. Please don't forget to write down your assigned number on the top of the paper.

4. After you finish the puzzle and questionnaire, please remain seated and wait for further instructions and next puzzle.

As phase one is completed, experimenter continues with the phase two:

1. There will be no more puzzle solving required from you. I just need a few more minutes to compile quickly the data from your questionnaires. In the meantime, you can try to solve some of the unsolved puzzles that I have, or you can browse through these magazines or your phone.

After five minutes, the experimenter comes back to the room:

1. Thank you for your patience, I'd just need your contribution in this last questionnaire.

2. After you leave this room, you are not allowed to comment on the experiment with the next group of participants.

Figure 4. Questionnaire

Please assess the puzzle using the following ten-point scales between opposing concepts.

Assess which of the concepts describes the puzzle better (for example on the ten point-scale between *bad* and *good*, 1 stands for ‘extremely bad’, 2 for ‘quite bad’, 3 for ‘slightly bad’, 4 for ‘equally good and bad or neither’, 5 for ‘slightly good’, 6 for ‘quite good’, and 7 for ‘extremely good’).

Unenjoyable	1	2	3	4	5	6	7	8	9	10	Enjoyable
Bad	1	2	3	4	5	6	7	8	9	10	Good
Boring	1	2	3	4	5	6	7	8	9	10	Interesting
Tiring	1	2	3	4	5	6	7	8	9	10	Exciting
Easy	1	2	3	4	5	6	7	8	9	10	Challenging
Worthless	1	2	3	4	5	6	7	8	9	10	Worthwhile
Intimidating	1	2	3	4	5	6	7	8	9	10	Encouraging

Please specify your gender:

- a) Male
- b) Female
- c) I’d rather not state

Please specify your age:

\_\_\_\_\_

Please specify your program:

- a) HTM
- b) IT

Please specify your place of residence:

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\*Demographic questionnaire is added only to the first sample puzzle questionnaire