



# Personality in Personalisation: A User Study with an Interactive Narrative, a Personality Test and a Personalised Short Story

Waltteri Nybom<sup>(✉)</sup> and Mick Grierson

Creative Computing Institute, University of the Arts London, London, UK  
w.nybom0620201@arts.ac.uk

**Abstract.** We present a user study developed to explore the use of psychological frameworks for the personalisation of narratives. Further, we explore using interactive narratives to understand the user's personality and narrative preferences. The study consists of three sections: an interactive narrative, a personality test, and a personalised short story. Whilst it would appear that at least this interactive narrative could not be used as a personality test per se, it was able to capture some traits. The personalisation appeared to work well, especially regarding relating with the protagonist. It was also found that extraverted people appear to prefer reading narratives with less formal language, and introverts prefer narratives with more formal language.

**Keywords:** Personalisation · Personality · Narrative

## 1 Introduction

What makes a good story? Any subjective answer to the question would, by definition, be down to the person answering the question. To present them a suitable story, we could find one matching their preferences, or, more intriguingly, make one fit them. Trying to understand the person using methods from psychology, the narrative could be made to have different variations for different personalities. But how do we get an understanding of the person's personality? Using their social media data would not always be possible or ethical. Using a personality test might not necessarily be much fun to the user. Then, why not use a method that should be fun for anyone interested in narratives: a narrative? That is what this study does: presents the users with an interactive narrative designed to capture their personality using the five-factor model (FFM) and the Need for Affect (NFA), and then personalises a narrative to match with their personality scores. This study seeks to consider various ways of personalisation at the same time, focusing on written, non-interactive narratives, and testing how this affects the reader experience.

## 2 Background

### 2.1 The Five-Factor Model

The five-factor model (FFM) [16], often considered the gold standard of personality psychology, features five traits: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience. The factors have been found in many studies to influence preferences in narratives and media. [42] found that people with high scores in neuroticism, the reverse of emotional stability, had a strong preference for sad music and avoided light-hearted film genres, and psychoticism, an opposite of agreeableness, indicated a preference against comedy but one strongly for graphically violent horror movies. [47] found evidence that sensation seeking, represented by openness and extraversion, involved a preference for novel and arousing media across genres. Many such correlations have also been found in other studies [10, 14, 27, 28, 33, 34, 43, 46]. Various other online activities, such as personal websites [39], Facebook profiles [4], emails [13] and even email addresses [3], can also reveal a person's personality to human observers. Computer-based personality judgments can indeed be more accurate than ones by humans, according to [44], who created an algorithm they found to accurately predict all FFM traits simply based on likes on Facebook.

Games have been used to research personality in several studies; [15], noting that games can have similar qualities to psychometric tests while being more engaging, propose a game for daily cognitive assessment. The Five Domains of Play theory [38] translates the FFM into five aspects of gaming motivation: people with a high score in openness to experience seek novelty; conscientiousness matches with challenge; extraversion with stimulation; agreeableness with harmony; and neuroticism with threat. [40] tested the model, finding that for participants younger than 60, four out of five personality traits correlated significantly but weakly with their corresponding game preference domains ( $r = 0, 13 - 0, 30, p < 0, 05$ ). [24] applied the FFM for adjusting difficulty in a first-person shooter game, with a linear regression model aiming to optimise enjoyment and gameplay duration. [37] found a correlation between gameplay metrics and all the five factors. [18] also created a method for generating a FFM profile during gameplay for the players, which is then used to define their quests.

### 2.2 Need for Affect

There have been various studies and versatile results on the topic of what sort of personal characteristics explain enjoyment of negative emotions in art. For example, [9] found that people with high empathy enjoyed tragic films more. [41] linked it to high openness to experience and empathy.

One promising approach could be the Need for Affect (NFA), which refers to how motivated people are to seek emotion-inducing situations and activities [21]. Media use or preference is not a part of its definition or operationalisation, but the study did have participants rate their willingness to see specific films after having read descriptions of how interesting, happy, and sad each of them

was supposed to be. The willingness to see happy and sad films rather than less emotional films was higher for individuals with a strong NFA. [21] note that while sensation seeking is conceptually similar to the NFA, they found them empirically distinct.

High NFA scores appear to match with willingness to watch films with affectively negative content, but only in females [1]. [6] found that people with high NFA enjoyed horror films more. They found the NFA as the first personality trait found to be a consistent predictor of individuals' engagement with negative and ambivalent emotion experiences regardless of gender or genre. Therefore, using it in combination with the FFM could be helpful in determining possibly the most important issue in personalisation: whether the narrative should be ultimately happy or sad.

### 2.3 Narrative Personalisation

User modelling has been widely used to adapt computer games, but relatively little to determine storylines, often using factorial models of user types in interactive narratives, such as in PaSSAGE [5, 35], Mirage [11], and [31]. Some assess the user's present emotional state, as in [32], or their comprehension of the narrative, as in [8]. It is also possible to focus on just narrative preferences, which can be treated as a collaborative filtering [17] problem, as in [45], whose drama manager learns a user's preferences from ratings on story fragments and then chooses successive plot points.

There is also some work on personalising language, typically with chatbots, such as in [30] who used the user's FFM personality type. The Personage system [22] produces utterances matching FFM profiles. It has also been used for making variations of stories slightly different stylistically, such as in the use of swear words, exclamation marks and stuttering [29] and, together with the Scheherazade story annotation tool [12], altering between first- and third-person narrators, and the shyness levels of their language [19, 20].

## 3 Methodology

The study<sup>1</sup> had 59 participants (17 women, 36 men), volunteers of all ages above 18 who were found by posting about the study on internet discussion boards on interactive narratives and other relevant topics.

The first part is an interactive narrative specifically written for this study. It uses a 2nd person perspective where the user assumes the role of the protagonist and makes choices that determine what the protagonist does and how the plot advances. All but one of the 25 questions simulate a personality questionnaire on a five-point Likert scale, with the possible options ranging from one extreme to another, measuring either one of the factors in the Five-Factor Model (FFM) or the Need For Affect (NFA). The questions relating to FFM are about how the

<sup>1</sup> Available at <https://cci.arts.ac.uk/~wnybom/zombies>.

protagonist responds to the situation, for example in a very extraverted or a very introverted manner, and the questions measuring NFA are about deciding what happens next, ranging from something light-hearted to something very dark. Most choices do not affect the narrative trajectory, except for three questions, resulting in  $2 \times 3 \times 5 = 30$  different ways the story could end up.

The participants then take a 10-item FFM questionnaire [26] and a 10-item NFA questionnaire [2]. Each question in both the narrative and the personality test is given a score from 0 to 4, and the total score for each trait is scaled in a normalised range from 0 to 1. Finally, the scores for the questions in the narrative are readjusted with ridity scores [7] to take into consideration how specific questions tend to get answered. Here too, a normalised range from 0 to 1 is used.

In the final part, the users are presented with a short story written for the experiment and personalised for them. Users are defined as being either high or low in a given trait and are given a version that matches with that. Group 1 have this done according to the results of the interactive narrative presented (henceforth referred to as IN), group 2 according to the personality test (PT), and one control group will get the opposite of what they'd get in group 1. The users are asked how much they liked the story and its language and how much they identified with the protagonist.

The narrative has two different versions: one with high, and one with low extraversion. This affects the use of language throughout every section. The story is then split into six different sections, and, apart from the section that is the same for everyone in the same extraversion pathway, there are two versions of each section under both extraversion pathways depending on whether the user has a high or low score in a given trait. The protagonist's personality depends on the user's FFM scores other than extraversion, and the ending on NFA: a high NFA indicates a preference for a more emotional, tragic ending; a low NFA a less emotional, somewhat happy ending. Therefore, there are  $2^6 = 64$  different variations of the story.

FFM traits have been found to have various correlations with what sort of language people use, and here it is hypothesised that people would also like to read the sort of language they prefer to use. The most important FFM trait in this and many other respects has been found to be extraversion [23], and therefore, to avoid complicating things, it is the only trait used for personalising language in this study. Since it is used for this purpose, it is not used in other forms of personalisation; e.g. adjusting the protagonist's personality, to separate the effect of personalising language from that of personalising the character. Nevertheless, since extraversion is arguably the most important and the most widely understood FFM trait, it is the most likely one to affect identifying with the character, so if the other traits are helpful at all, extraversion would be highly likely to be so as well.

The way the use of language is personalised here is based on previous studies that have shown that people with high extraversion write using simple constructions; short sentences; few quantifiers; informal, affective language; the pronouns

“we” and “which”; confident language featuring much words such as “want” and “need”; stylistic expressions such as “catch up” and “take care”; and a lot of semantic errors. Introverts, on the other hand, prefer the reverse: more long, formal and complex sentences; few errors; the pronoun “I”; negations; quantifiers; and less confident language such as “trying” and “going to” [23].

## 4 Results

### 4.1 Interactive Narrative

The personality scores given by the interactive narrative (IN) had varying correlations with the personality scores given by the personality test (PT), slightly improved by the ridit analysis (Table 1).

**Table 1.** Correlations of traits as judged by IN and PT, readjusted with ridit scores

Trait	Spearman correlation	<i>p</i> value
Extraversion	.425	.001
Emotional stability	.323	.012
Conscientiousness	.155	.241
Agreeableness	.128	.335
Need for affect	.035	.791
Openness to experience	.018	.89

It appears the IN was able to make an approximate assessment of the user’s extraversion and emotional stability, but not the other traits. NFA(IN), or NFA according to the IN, did not have any significant correlations with anything, especially with NFA(PT), but got close to significant correlations with agreeableness(PT),  $\rho = -.233$ ,  $p = .076$ , and with openness(PT),  $\rho = -.211$ ,  $p = .108$ , both negative but not quite significant at  $p < .05$ .

The IN also appears good at judging openness in those identifying as women ( $\rho = .469$ ,  $p = .058$ ), but for men the correlation is actually negative ( $\rho = -.273$ ,  $p = .107$ ); neither are quite statistically significant. Particularly for women, statistical significance was hard to reach due to the small number of participants who identified as women (17).

### 4.2 Personalised Short Story

Some people took the experiment rather quickly and presumably carelessly, and one person confessed to just skim-reading the personalised narrative. Therefore, we exclude from the personalised short story analysis the 14 people who spent less than ten minutes on the test.

**Table 2.** Average scores by group, scale 1–5

Group	Liking story	Relating	Liking language
1 [n = 9] (IN)	3.56	2.78	3.55
2 [n = 19] (PT)	3.37	3.00	3.58
3 [n = 17] (Control, IN)	3.00	2.35	3.00
Kruskal-Wallis <i>p</i> value	.342	.197	.022

We can note that extraversion according to the PT had .387 correlation with relating with the protagonist in the high-extraversion version of the short story (n = 21), but  $-.24$  in the low-extraversion version (n = 24), meaning that the more extraverted the user is, the more they relate with the protagonist if the language used is extraverted, but if the language is introverted, the reverse happens: the more introverted the user is, the more they relate! The *p* value for such a difference in correlations is .021. There were many such correlation differences, with only the statistically significant ones presented in Table 3.

**Table 3.** Significant correlation pairs, comparing groups presented with different version of the short story

Trait	Rating	IN			PT		
		Corr (high-trait group)	Corr (low-trait group)	<i>p</i>	Corr (high-trait group)	Corr (low-trait group)	<i>p</i>
Extraversion	Relating with protagonist				.387 [n = 21]	$-.24$ [n = 24]	.021
Extraversion	Liking the language	.136 [n = 24]	$-.41$ [n = 21]	.037	.389 [n = 21]	$-.638$ [n = 24]	< .001
Conscientious-ness	Relating with protagonist	.381 [n = 29]	$-.176$ [n = 16]	.044	.109 [n = 29]	$-.426$ [n = 16]	.048
Stability	Relating with protagonist	.104 [n = 26]	$-.422$ [n = 19]	.044			
Openness	Liking sad ending				$-.364$ [n = 25]	.333 [n = 20]	.012
NFA	Relating with protagonist more in sad ending	.169 [n = 25]	$-.382$ [n = 20]	.038			

Gender was also a major factor with the ending. For men, the ending made little to no difference, as versions with the happy ending were found just marginally

better (3.27 [n = 15] vs. 3.07 [n = 15], Mann Whitney U  $p = .24$ ). However, for women, the sad ending was greatly preferred (3.71 [n = 7] vs. 2.6 [n = 5], Mann Whitney U  $p = .014$ ) (Table 4).

**Table 4.** Ratings by gender

	Men			Women		
	Happy ending [n = 15]	Sad ending [n = 15]	Mann Whitney U $p$	Happy ending [n = 7]	Sad ending [n = 5]	Mann Whitney U $p$
Liking	3.27	3.07	.24	2.6	3.71	.014
Relating	3.0	2.4	.071	2.4	3.0	.11
Language	3.4	3.33	.41	3.0	3.57	.043

## 5 Discussion

### 5.1 Interactive Narrative

As noted above, the IN was able to make an approximate assessment of the user's extraversion and emotional stability, but not the other traits. It should be noted that its way of measuring NFA did not match with the way NFA is tested, but with the way the authors of NFA describe the preferences for art that people with high NFA are expected to have: the more emotional and intense, the better. This study would give some indication that this is not necessarily the case.

The scores given by the IN followed a more standard distribution than those from the PT, particularly with ridit scores. According to the PT, the participants had a particularly low average score in extraversion (.32) whilst being high in openness to experience (.77), for example, which makes sense given the way they were recruited, but this could skew the results given by the IN, which had all of the average scores between .43 and .54 before ridit, and .45 and .50 after ridit. Some choices in the IN were far more popular than others, typically with bias in favour of the middle options. When the bias was away from the middle options, however, the ridit scores pulled the scoring closer to the middle.

In question 23, the user is asked whether to slip a housemate's medications into his drink. The choice is presented only to add to the user experience and the user's sense of control, and has no influence on personality scores. Interestingly, almost half of the users (26/59) decided to do so, and of those who did, few (8/26) wanted to see him unwell afterwards, though this was very common (28/33) in the group that chose not to! This was the only question where previous choices could have such influence on answers, being avoided specifically for issues like this. This gives some clue that while people often want to see suffering in interactive narratives, they don't want to feel like it's their fault.

## 5.2 Personalised Short Story

According to Kruskal-Wallis tests, the only statistically significant inter-group difference for the ratings for the story (Table 2) was with the language,  $p = .022$ . However, the scores between the groups are not directly comparable; for example, group 2 got the sad ending much more than others, which could skew the results slightly in their favour, since that ending was more liked on average. This is because users tended to get high NFA scores in the PT (average .61), which defined the personalisation of group 2, but the results were more balanced in the IN (average .45), which was used in groups 1 and 3. Nevertheless, it is easy to note that the control group performed the worst in every aspect, suggesting the personalisation did improve the experience.

Looking at Table 3, we can note that adjusting the language depending on level of extraversion worked well regarding liking the language, and, in the case of the PT, also with respect to relating with the protagonist (who was also the narrator). Personalisation based on conscientiousness and emotional stability(IN) also worked particularly well in making the protagonist relatable. Openness(PT) indicated liking the happier, less emotional ending, and therefore would apparently have been better for personalising the ending than NFA was, though NFA(IN) appeared to work too, but did not quite reach significance ( $-.028$  vs.  $-.45$ ,  $p = .079$ ). NFA(PT) seemed to have the opposite effect, which would have reached significance without removing the fast experiment takers. However, NFA(IN) did work in making the protagonist relatable. Generally, the IN worked in many ways much better than the PT, though many correlations weren't found quite significant and therefore weren't mentioned here.

## 6 Conclusions

It was found that extraverted people appear to prefer reading narratives with less formal language, and introverts prefer narratives with more formal language, or specifically, the types of language extraverts and introverts have been found to write; this does not appear to have been tested before. Whilst it would appear that at least this interactive narrative could not be used as a personality test per se, it was able to capture some traits, specifically extraversion and emotional stability. It is possible that with agreeableness, conscientiousness and openness to experience, people might indeed have a preference to act within fiction differently from how they would in reality; for example, someone who is agreeable in reality might want to get a safe experience of what it is like to be rude. Whether they would then want to see protagonists behaving like this as well, or preferably like they would in reality, is an open question.

We should also consider the possibility that the personality tests did not measure traits ideally. Short versions were used to not bother the participants too much, but longer versions might have been more accurate. On the other hand, some people could have been rather uninterested in the personality test section and clicked through it rather carelessly, and making it longer could have exacerbated such a problem. It is therefore possible that interactive narratives

could capture at least some aspects of personality even better than personality tests, and in fact the IN was at least as good as the PT for personalisation. Questions in personality tests can be rather abstract and open to interpretation, even ambiguous, but in an interactive narrative, the user is put into a specific situation in a rather concrete manner. NFA, however, did not appear to work as intended, except with the way the IN interpreted it. Therefore, perhaps NFA(IN) could be re-defined simply as a preference for tragic rather than lighthearted themes in narratives – perhaps this could be called Preference for Tragedy, or PFT.

The personalisation with individual FFM traits also appeared to work well for relating with the protagonist. However, the effect could have been limited by the fact that the sections displaying the protagonist's personality were rather brief. Therefore, that a type of personalisation did not appear to work with this story does not mean that it could not work when done better, in a longer narrative, or with more participants, and that it did appear to work here could in some cases be down to just chance. Similarly, at least some of the questions in the interactive narrative could have been just poorly made. Therefore, more similar studies would be helpful. Other ways of personalisation could also be done based on FFM, such as more novelty for people with high openness for experience. Next, we plan to try NLP for altering the writing style, which could vastly ease the process.

In the future, it should be studied how interactive narratives could better capture personality. More such narratives should be written, and the kinds of choices that best correlate with personality scores should be chosen for further usage. Such choices would not necessarily have to be on a Likert scale. Collaborative filtering could also be used, and with enough participants and questions, surprising links could be found, which in turn could help personality research as well. Finally, the user profile thus created could also later be used for a recommender system, particularly with narratives, but possibly with other domains, as well; it has indeed been found that FFM can be useful in recommenders, particularly when there is little data available on the user [36], as well as for increasing the diversity of recommendations [25]. Ultimately, the approach could be used to personalise just about every aspect of narratives, as well as to recommend and perhaps generate more.

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