

Exploring the “Magic” of Algorithmic Predictions with Technology-Mediated Tarot Card Readings

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ABSTRACT

We draw parallels in the predictions made by algorithms to those of divination, which likewise render the abstract into actionable recommendations. Because of their inherent opacity and grounding in quantitative data, algorithmic predictions appear to possess a sense of technical “magic” that non-experts do not often perceive as a constructed reality; by contrast, fortune telling is frequently viewed with skepticism, received not as truth, but instead as a means for entertainment or self-reflection. Our objective is thus to evaluate whether reframing algorithmic predictions with a deliberately mystical lens may lead people to reconsider the authority of technical objects. We design a system which enables self-guided tarot card readings, involving a conversational interface, screen-based visualization, and natural language processing to make predictions of the user’s past, present, and future. In 10 research sessions with our prototype, we found that interactions reflected broader, generalizable insights about interactions with computational prediction systems, including lack of user agency when faced with potential manipulation, privacy concerns, as well as poor performance. Within the traditions of reflective and speculative design, we discuss implications of computing’s tendency toward magical presentation and imagine alternate paradigms.

TABLE OF CONTENTS

INTRODUCTION	2
BACKGROUND	3
Divination and New Media	3
Psychic Mediums and Media Literacy	4
Astrology as Spreadable Media	6
Related Work in Human-Computer Interaction	8
Inspirations from Art and Culture	10
PROTOTYPE SYSTEM DESIGN	12
Interaction Design	12
Classification and Predictions	14
Tarot: A Brief Primer	14
“Past” Tarot Card	15
“Present” Tarot Card	16
“Future” Tarot Card	16
Custom Tarot Card Design	17
RESEARCH METHODOLOGY	18
PARTICIPANT FEEDBACK	19
Explaining Visualization Content	19
Willingness to Share Personal Data	21
Trust and Immersion in the Experience	21
DISCUSSION	22
CONCLUSION	24
REFERENCES	26
APPENDICES	30
Appendix 1: Chatbot Script	30
Appendix 2: Tarot Texts and Mappings	33
Appendix 3: Follow-Up Discussion Guide	43

INTRODUCTION

Powered by the rise of data collection and aggregation, machine learning algorithms are increasingly equipped to make predictions about individuals and enabled to automate decision making. Artificial intelligence has thus been widely adopted in online commerce and social media platforms, optimizing consumption with personalization; yet it is also seeping into systems that are far more consequential – including hiring, law enforcement, fraud detection, and more. We argue that algorithms are being increasingly trusted with such classification decisions because their complex, mathematically-based infrastructure is perceived to reveal objective, underlying truths rather than constructing new realities. Moreover, advanced technology is often indistinguishable from magic, as science fiction writer Arthur Clark (1999) famously claimed. The “magic” of algorithmic predictions is thus explained by the seeming authority of quantification, often obscuring the human labor of performing measurement and defining thresholds. As computer scientist Judea Pearl (2019) aptly states: *“Data science is a science only to the extent that it facilitates the interpretation of data – a two-body problem, connecting data to reality. Data alone are hardly a science, no matter how ‘big’ they get and how skillfully they are manipulated”* (p. 19).

Part of the algorithm’s mysticism also emerges from its multifaceted opacity. Burrell (2016) defines a typology of algorithmic opacity, distinguishing that which (1) is intentional out of proprietary concerns, (2) arises from technical illiteracy, and (3) stems from the mismatch between mathematical optimization and human styles of semantic interpretation. Non-expert users lack access to information as well as comprehension of the scale and complexity of “big data,” left to develop “folk theories” about how resulting predictions are made. Eslami et al (2016), for instance, found that alternative displays of Facebook’s News Feed led research participants to develop 10 various explanations of how the curation algorithm worked; one of these was the *“Eye of Providence Theory,”* which expressed that no

explanation was possible because “*Facebook was powerful, perceptive, and ultimately unknowable*” (p. 2377).

We draw parallels in the nature of predictions made by algorithms to those of divination, which likewise render the abstract into actionable recommendations. From psychic mediums to astrological horoscopes, divination deduces predictions about constructs like personality, relationships, and more from known facts and behavioral patterns. Yet as we turn to divination as a form of guidance, our acceptance of it is not fully sincere; we do not necessarily believe in its predictions. Rather, fortune telling is often taken for a means of entertainment or of reframing one’s perception of the world. But superstitious beliefs can also be broken by new contexts – such as using a foreign language, rather than a native one (Hadjichristidis et al, 2017). The objective of our master’s thesis project is thus to evaluate whether reexamining algorithmic predictions with the mystical lens of divination may lead people to reconsider the authority of technical objects. As a provocation, we have designed a prototype involving a conversational interface, screen-based visualization, and classification system that enables self-guided tarot card readings. Within the realm of human-computer interaction, our project draws from reflective and speculative design practices to question unconscious values embedded in computing and to propose alternative possibilities.

BACKGROUND

Divination and New Media

From ancient Greek physiognomy to Russian folk alectryomancy¹, societies around the world have attempted to forecast the future with various forms of divination throughout history. But the “psychic services” industry in the United States has grown steadily in recent years, reaching an estimated revenue of \$2.2 billion in 2018 (IBISWorld, 2018). One may hypothesize this is linked to the declining number of Americans who are religiously affiliated,

¹ A predecessor to the ouija board, alectromancy is a form of divination that involves observing a rooster eat corn scattered on top of the alphabet, then noting letters of significance based on the animal’s behavior.

which is down from 84% in 2007 to 77% in 2014 (Pew Research Center, 2015). However, “new age beliefs” – which include faith in reincarnation, astrology, psychics, and the presence of spiritual energy in physical objects – are nearly equally prevalent among those with and without religious affiliations (Gecewicz, 2018). While the identification of such trends generally considers correlations of belief with ethnic backgrounds, education levels, and political leanings, we examine the role of technology in cultivating such beliefs, focusing on two case studies: psychic mediums in relation to media literacy and astrology as a form of spreadable media.

Psychic Mediums and Media Literacy

Believed to possess extrasensory perception (ESP) or other supernatural abilities, psychics lack credibility within the scientific community; yet according to a Pew Research Center survey, 41% of Americans believe in them (Gecewicz, 2018). We posit that this surprisingly high number is due to the presence of mediums in the media. Psychics have appeared on television for decades, through paid avenues such as Miss Cleo’s infomercials of the 1990s, as well as guest appearances on daytime talk shows and evening news segments (LastWeekTonight, 2019). While psychics admittedly make for entertaining viewing, their appearances on mainstream media legitimize pseudoscience and confound our abilities to detect it. This societal lack of media literacy is mirrored in the recent awakening to how we are seemingly inept at distinguishing “fake news” from fact-based journalism, given that humans are “*gullible convenience seekers who put the most trust in that which seems familiar*” (Anderson & Rainie, 2017).

Psychics remain particularly relevant in contemporary cultural consciousness as they have adopted new forms of technology into their practices: readings are increasingly taking place over video chats and promoted on social media (IBISWorld, 2018), giving new context for the notion of an online “influencer.” Fortune telling via collect calls, once commonly

advertised via infomercial, are now “cold” and familiar, replaced by the “hot,” media-rich medium of video chats (McLuhan, 2002). Consider also the shift of psychics appearing as guests on television programs to now hosting their own reality shows, such as “Hollywood Medium with Tyler Henry,” “Mary Knows Best,” and “Psychic Tia” (LastWeekTonight, 2019). Psychic work is particularly well suited to social media and reality television, given its emphasis on drama, affect, and sensorial richness over factual accuracy. Furthermore, the adoption of new media formats by psychics ensures their occupancy of public mindshare in an economy increasingly driven by the monetization of attention.

With the availability of personal information on the Internet, psychics are also more easily able to employ “hot” readings of potential clients. Despite using the same temperature-related terminology, this is notably distinct from McLuhan’s notion of hot and cold media: while cold readings involve making vague, high-probability guesses and then narrowing in on feedback based on cues detected, hot readings involve making specific statements or “predictions” based on details discovered about subjects in prior research (LastWeekTonight, 2019). Performing such hot readings is now much easier to achieve convincingly because of the data trails we leave within “networked publics” online: our digital activities are often persistent, replicable, scalable, and searchable by default (boyd, 2010), making anonymity difficult to achieve. As Hitt (2019) writes, *“One new source of psychic intel is Facebook, which has become a clearinghouse for the kind of insider, personal detail that psychics used to have to really sweat for.”* Though the 2018 Cambridge Analytica scandal has raised awareness of the newly possible societal ills that may emerge from social media use, it also highlights the public’s general lack of contemporary media literacy that has contributed to the thriving of psychic practices.

Astrology as Spreadable Media

While the National Science Foundation (2018) reports that the majority of Americans consistently believe that astrology is “not at all scientific,” the margin of majority is rather slim, particularly for younger age groups: only 54% of 18-24 year olds and 53% of 25-34 year olds rejected astrology’s scientific grounding. Part of the popularity among younger age groups may be correlated to the way astrology appears to be thriving online. According to Stella Bugbee, the president and editor-in-chief of *New York Magazine’s The Cut*, a typical horoscope post on the website got 150% more traffic in 2017 than the year before (Beck, 2018). As with the case study of psychics, some of this growth can be attributed to the way in which astrology has continued to evolve, making itself “hot” to maintain relevance: consider the mobile application Co-Star, which claims to make its predictions using AI and real-time NASA data (Co-Star Astrology Society, 2017).

But astrology possesses a uniquely paradoxical appeal as well, seemingly both abstract and concrete. Unlike the ESP of psychics, astrology is more likely to be perceived as both spiritual and logical, perhaps since it is commonly perceived to bear a relationship to the physical science of astronomy (National Science Foundation, 2018). This dual quality is somewhat analogous to our conception of the internet, knowable in the sense that we use it everyday, but also unfathomable as a massively distributed “hyperobject” (Morton, 2013). Moreover, astrology’s believed relationship to astronomy makes it seem cosmic and universal, while each horoscope is at the same time conversely intended to feel uniquely personalized to the reader.

Embodying these seemingly oppositional traits makes astrology apt for propagation through networked communication channels. Astrology’s efficient communication of insights makes it particularly well suited to the pace of contemporary life, in which information travels with ever greater speed and attention spans are shortening. As Beck (2018) writes for *The Atlantic*:

“Astrology expresses complex ideas about personality, life cycles, and relationship patterns through the shorthand of the planets and zodiac symbols. And that shorthand works well online, where symbols and shorthand are often baked into communication.”

Astrology-related content is thus highly “spreadable,” with “the potential – both technical and cultural – for audiences to share content for their own purposes” (Jenkins et al, 2013, p. 3). Lacking the requisite extrasensory gifts of psychics, astrology is accessible to anyone who wishes to participate: with a basic understanding of the signs, audiences can relate them to current events or other contemporary topics in continuously evolving, memetic ways. Cyclical astrological calendars also enable the creation of content that is both novel and consistently relevant. In fact, in his examination of divination in ancient hunting rituals, anthropologist Moore (1957) suggested that divination serves the role of a random selection mechanism, a chance-like instrument that introduces irregularity and prevents tribes from overhunting in any given area. Under this lens, astrology offers an organized framework for iteration, enabling opportunities to create original, ever evolving content.

Beyond astrology’s persistent relevance, another explanation of public receptivity to horoscopes may be associated with the social stresses brought on by the constant connectivity and ubiquitous computing of contemporary life. As psychologist Tyson (1982) found in his study of people who consult astrologers, *“under conditions of high stress, the individual is prepared to use astrology as a coping device even though under low-stress conditions he does not believe in it”* (p. 125). This finding was particularly pronounced for socially-related stress, which recent studies have acknowledged as emerging from the increasing use of “push” technologies: 43% of Americans “constantly check” their emails, text messages, or social media accounts, reporting an overall stress level of 5.3 (on a 10-point scale), compared to the average of 4.4 for non-constant checkers (American Psychological Association, 2017). A report from J. Walter Thompson Intelligence thus suggests:

“We are increasingly turning to unreality as a form of escape and a way to search for other kinds of freedom, truth and meaning...What emerges is an appreciation for magic and spirituality, the knowingly unreal, and the intangible aspects of our lives that defy big data” (Solowij, 2016).

Whether the motivation for engaging with fortune telling is to seek novelty or to reduce stress, astrology often involves direct participation in the generation of culture, unlike the passive spectatorship of psychic performance. As a form of divination, it is thus primarily useful not for the specific solutions it offers, but rather its assistance in iteratively shifting one’s perception of the world in the face of the unknown. In our tarot-card system, we draw from these case studies to juxtapose both proactive and reactive ways of engaging with divination. Mirroring the extrasensory gifts of psychics, the system’s technical components may appear to possess mystical knowledge that the viewer does not; however, rather than permitting passive reception, the work facilitates viewers in proactive conversation, sparking generative ideation and self-reflection, as one engages with astrology.

Related Work in Human-Computer Interaction

From a technical perspective, our implementation draws from the field of computational conversational agents, which date back to the 1960s. Developed by Joseph Weizenbaum (1966) at MIT, ELIZA introduced a rule-based computer program that enabled certain kinds of natural language conversation between human and a computer. Over time, the technology behind conversational machines has evolved from methods that use rules to statistical inference, and most recently, machine learning. Recent advancements in deep learning have given rise to a more robust family of chatbots which are able to converse well in a specific narrow domains such as answering financial questions and booking flights. The building blocks on which these bots are built upon often consist of:

- **Automatic Speech Recognition (ASR):** Generating raw or punctuated transcripts of speech from audio inputs

- **Intent Recognition:** Classifying intents of the user based on text utterances, or what the user wants to communicate²
- **Entity Resolution:** Identifying proper nouns in a sentence, e.g. “California”
- **Sentiment Analysis:** Detecting how positive or negative the speech is
- **Topic Modeling:** Knowing what the speech could be about

Advancements in audio hardware have also been essential to the development of voice agents. In the field of digital signal processing, multiple microphones began to be used to perform noise cancellation and to extract the signal of desired frequency range, for example, that of human speech. As a result, machines can now differentiate a real person from a sound from a television set and could hear a person from a distance away.

In addition to technical contributions, another body of relevant work focuses on the relationship between robots and voice agents with humans. The Media Equation Theory (Reeves & Nass, 1996) claims that humans treat technological artifacts, including conversational bots, as social actors. There is also evidence that users have the tendency to disclose more personal information when interact with interfaces that require speaking and listening (Yu et al., 2019). Researchers have leveraged this relationship to create machines that encourage people to tell their stories: one such project is Boxie, a documentary-making social robot for gathering structured social videos (Reben & Paradiso, 2011). The therapeutic function of chatbots has also been explored in industry: nearly 100 results are returned for a search of “therapy” in the Alexa skills department of Amazon,³ suggesting no shortage of modern takes on the original ELIZA.

Within the realm of human-computer interaction (HCI), our project additionally draws from the domain of reflective and speculative design, proposing possibilities that diverge from existing conventions (Sengers et al, 2005). For instance, Aylett, Cowan, & Clark (2019) suggest that voice interfaces need not perfectly mimic natural human speech; rather, they should take a more radical and performative direction, beyond the uncanny valley. In

² For example, “Play some Pink Floyd” and “I want to hear Pink Floyd” both convey the same intent, which is to command the machine to play songs by the band, Pink Floyd.

³ At the time of writing in May 2019.

their anxiety-addressing design metaphors, Pierce & DiSalvo (2018) also imagine “Digital Crystal Balls and Algorithmically Self-Fulfilling Prophecies” as a possible future “*where personal recommendations and predictions are so irresistible or reputable that they manifest reality*” (p. 9).

Inspirations from Art and Culture

From HAL 9000 of the *Space Odyssey* series to Samantha from the 2013 movie, *Her*, conversational agents have been recurring characters in film and popular culture, particularly as creators discovered that technological blunders and glitches of AI agents act as a form of entertainment. For example, San Francisco based comedy group The Fun Room created “Alexa, Improvise,” a show where performers interact with an Amazon Echo device to make fun of its responses (Lee, 2018). In fact, several voice assistants are also designed with this performative quality in mind: Apple’s Siri is loaded with witty pre-written responses for questions like “*Siri, do you have a partner?*” As a new media provocation, our project is a form of performance, inspired by mechanistic fortune tellers like Zoltar machines that perform mystical dialogues and animated sequences before revealing a user’s fortune.

Beyond popular culture, we draw inspiration from a number of creative artworks that have likewise made a connection between technology and divination. One such project is Suzanne Treister’s “HEXEN 2.0” (2009-2011) series, which includes a custom tarot deck and “Cybernetic Seance” video, investigating post-World War II government programs of mass control in relation to parallel countercultural movements. A more recent work that speaks the contemporary age of surveillance capitalism is “New Organs” by artists Tega Brain and Sam Lavigne, a collection of videos featuring user-submitted stories about experiencing uncanny, psychic-seeming targeted advertisements (Brain & Lavigne, 2018).

Other inspirations come from artistic work responding to individual profiling or predictions made by analyses of aggregated data, with a preference for the playful over the

sinister. Some of these speak directly to privacy concerns, such as Heather Dewey-Hagborg's "DNA Spoofing," which mirrors the intent of IP spoofing to propose *"DIY techniques for counteracting genetic surveillance"* (Dewey-Hagborg, 2013). Another relevant work is Giorgia Lupi's "Data Portraits" (2017), which created personalized representations of conference attendees' survey responses to evocative questions like *"When do you get your best ideas?"* and *"How messy is your desk?"* Coding participants' responses to an original visual design system, the resulting "data portraits" are colorful and abstract, intended to be publicly displayed and to spark conversations during the event.

We also build upon the emergent area of art practice which engages AI to make the invisible visible, or to challenge the "black box" nature of algorithmic prediction. One work of this type is artist Trevor Paglen's "Sight Machine," featuring a live performance by the Kronos Quartet and real-time algorithmic assessments projected on a large screen above the musicians. Describing the work, Paglen stated for *The New York Times*:

"I wanted to make an artwork that really underlined the contradiction between how machines see and how humans see ... Because music is so affective and is just as corporeal as it is cerebral, I thought coupling a music performance with machine vision adds up to something that works on an emotional, aesthetic and intellectual level" (Baumgardner, 2017).

In foregrounding computational inferences on a typically subjective experience, Paglen invokes the audience to question the machine's processes for rendering its precise and "objective" results; we take on a similar tone in the development of our system.

PROTOTYPE SYSTEM DESIGN

To provide self-mediated tarot-card readings, the prototype involves a conversational chatbot interface and animated visualization for feedback. The user's speech is then converted to text and analyzed with natural language processing to (1) identify topics, (2) analyze sentiment, (3) make predictions, and (4) generate tarot cards.

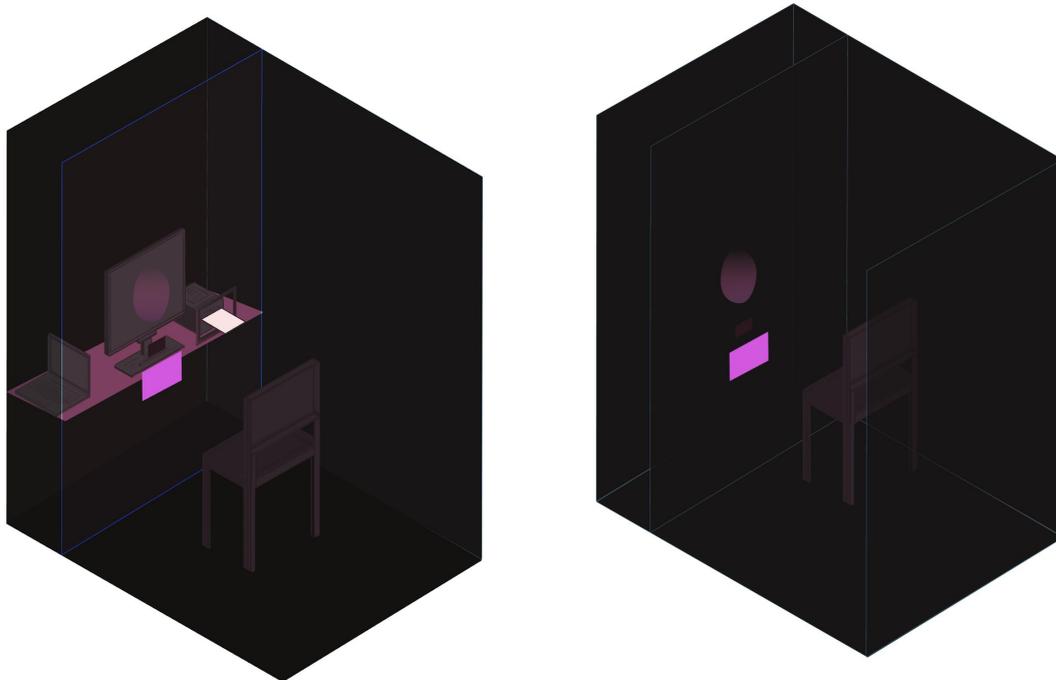


Figure 1. Overview of the prototype system setup (left) and with technical components hidden behind a curtain, as the user experiences it (right).

Interaction Design

To begin, the user enters a structure measuring approximately 3.5 ft wide, 6.5 ft deep and 6 ft tall,⁴ encased in black curtains and evocative of a confessional. With the lights turned off within this “black box” structure, the user is prompted to speak to a disembodied voice called “Perceptron,” named after an early learning device involving a one-layer neural network (Wolfram, 2019). The British-accented, female voice asks a series of increasingly personal questions, adapted from a line of inquiry that purports to enable falling in love (Jones, 2015). Questions were altered slightly, primarily to read more smoothly within a conversational interface. Some of the questions were also modified to solicit specific information related to the user’s technology behaviors and preferences. For instance, the question “*Would you like to be famous? In what way?*” became “*Would you like to be Internet famous? In what way?*” (See Appendix 1: Chatbot Script.)

⁴ The structure was created with PVC pipes and fixtures, with instructions from this photo booth building video tutorial: <https://www.youtube.com/watch?v=Yoieoi3XKl4>.

A colorful, animation accompanies the scripted text, displaying words and visual icons to enhance the experience (Figure 2). The screen is also used to provide real-time feedback, displaying topics identified from the conversation as the user speaks. The text visualization is created with ProtonJS,⁵ an open source particle systems library for JavaScript, and topics are identified with Empath, a tool by Fast et al (2016), which uses neural embedding to draw connotations between words and phrases. We used Empath’s 200 built-in topics plus our own augmented list of expected seed topics to improve performance of the visualization. Beneath the screen is a colored lamp to create ambiance, as well as a microphone array, to increase robustness against environmental noise and to improve accuracy of the speech transcription.

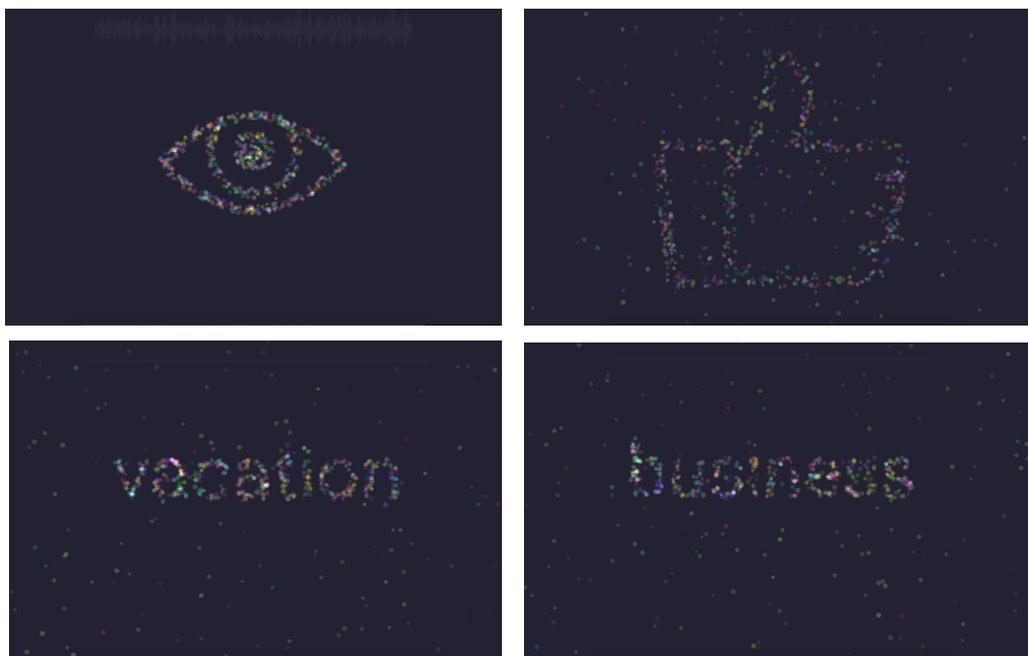


Figure 2. Sample words and icons used in the screen-based visualization.

Classification and Predictions

After the scripted questions have been answered, the user’s spoken text is analyzed to make three predictions, one tarot card each for the user’s past, present, and future. Among the nine questions, three questions are meant to elicit preferences and behaviors for each time period

⁵ <https://github.com/a-jie/Proton>.

(see Table 1.) For each prediction, a custom card is printed, and a brief message is read to the user.

Table 1. Scripted Question Order and Temporal Mappings

Order	Question	Temporal Mapping
1	Tell me about the last thing you liked online.	Present
2	If you were forced to delete all but one app, what would it be? Why?	Present
3	Would you like to be Internet famous? In what way?	Future
4	What does friendship mean to you?	Present
5	What would constitute a “perfect” day for you?	Future
6	What is your most treasured memory?	Past
7	What is the greatest accomplishment of your life?	Past
8	Take a minute to tell me your life story.	Past
9	If a crystal ball could tell you the truth about yourself, your life, the future or anything else, what would you want to know?	Future

Tarot: A Brief Primer

In the tarot deck, there are 78 cards total: 22 cards in the "Major Arcana," and 56 in the "Minor Arcana." The Major Arcana are considered to be long-term influences and thus the most important cards in the deck, featuring characters and symbols like "The Magician" and "The Wheel of Fortune." By contrast, the Minor Arcana cards are often seen as less important than Major Arcana cards, given that they pertain to issues that only have a short-term influence and may change over time. The Minor Arcana cards include number and face cards, split into four suits: Wands, Swords, Cups, and Pentacles. Each suit represents a different sphere of life, respectively: passion/creativity, emotion/relationships, intellect/reason, and money/responsibility.

"Past" Tarot Card

The first prediction, or the user's "past" tarot card, relies on classifying the user's personality according to the Myers-Briggs Type Indicator (MBTI) (Myers & Myers, 1995). Using spaCy,⁶ a natural language processing library in Python that provides a statistical text classifier, the

⁶ <https://spacy.io/>.

user's speech is labelled with one from each of the following four MBTI attributes: Extraversion/Introversion, Sensing/Intuition, Thinking/Feeling, and Judging/Perceiving. The classification model was trained with an open source MBTI dataset⁷ and a process mirroring the approach of Ang Ming Liang.⁸

Once identified, each of the 16 possible personalities was mapped to a Major Arcana card, using descriptions from reference websites for both the MBTI framework and tarot card meanings.⁹ The MBTI personality classification is not explicitly stated to the user; however, the spoken prediction was written based on texts from both MBTI and tarot card reference websites. As an example, a user classified with introversion, intuition, thinking, and perceiving traits (INTP) would receive the “The Magician” card for their past, as well as the following prediction:

“The Magician card is a reminder that you are a unique being, and that have many gifts that others do not hold. You are inventive and creative, and the Magician embodies these qualities. In the past, you have been singularly focused on originality and efficient results. However, this can make you prone to over analyzing your own thoughts and theories, to a point where you can stagnate in self-doubt.”

For a full list of mappings and predictions, see Appendix 2: Tarot Texts and Mappings.

“Present” Tarot Card

The next prediction is mapped to a Minor Arcana card. The suit was identified based on topics most commonly discussed in responses to the relevant questions, with custom seed categories created with 25 keywords each (Table 2). Responses to the three scripted questions focused on the present were also analyzed for positive/negative valence of sentiment, which was then used to assign the card number (1-10). The spoken prediction was written based on texts from the same tarot card reference websites.

⁷ <https://www.kaggle.com/datasnaek/mbti-type/>.

⁸ <https://github.com/Neoanarika/MBTI>.

⁹ The main website referenced for MBTI personality descriptions was 16personalities.com, while learntarot.com and tarot.com were referenced for tarot card meanings.

Table 2. Keywords for Tarot Suit Categories

Tarot Suit	Keywords
Swords	intellect, reason, thoughts, analysis, media, news, articles, twitter, blogs, websites, podcasts, videos, youtube, ideas, education, learning, thinking, reading, philosophy, information, knowledge, google, browser, search, library
Wands	passion, creativity, adventure, art, travel, explore, discover, pinterest, instagram, cooking, food, recipes, airbnb, spotify, music, netflix, museums, photography, camera, energy, imagination, expression, inspiration, fashion, beauty
Cups	emotion, relationships, romance, friends, family, community, social media, facebook, snapchat, whatsapp, texting, messages, tinder, okcupid, dating, contacts, talking, phone, love, mood, journal, diary, feelings, communication, memories
Pentacles	money, responsibility, finances, health, practical, productive, shopping, transportation, amazon, banking, zillow, house, job, work, insurance, delivery, uber, google maps, weather, email, calendar, alarm clock, accomplishment, investments, independence

“Future” Tarot Card

Like the “present” tarot card, the “future” prediction was also mapped to a Minor Arcana card. The suit and card number were identified using the same methods, but based on responses of the three questions focused on the future; measures were also taken to ensure that the user did not receive a future card in the same suit as the “past” card. The spoken prediction was again written based on texts from the aforementioned tarot card reference websites.

Custom Tarot Card Design

The main tarot card imagery was sourced from public domain image libraries online, rendering a more traditional aesthetic. Each design also included four relevant icons as more modern visual accents, to contextualize the meaning and interpretation of each card. The imagery was then run through a texture style transfer algorithm to add a consistent and futuristic feel. Cards were produced on demand with a photo printer after predictions were made, accompanied by a verbal description of each card’s meaning.



Figure 3. Designs for Major Arcana cards (left) and Minor Arcana cards (right).

RESEARCH METHODOLOGY

To evaluate our prototype, we conducted research sessions with 10 adults recruited through university-associated email list serves and our personal networks. Research participants were aged between 25-40 years, evenly split in gender composition (50% female), and diverse in terms of familiarity with tarot. Most participants had never had a reading but had been exposed to ideas about tarot through friends and family, while a few had experienced a less than 10 readings; one participant had also been giving herself and others readings for approximately 15 years. However, one limitation of the approach to recruiting was that the resulting sample was generally more educated and technically literate than the average American population.

Each 30-minute research session began with an informed consent procedure, as well as the presentation of an optional media release records form. Once the paperwork was complete, a researcher provided a brief introduction to the prototype, after which the user stepped into the prototype and received a self-guided tarot card reading, with the researchers in a separate room. When the tarot reading was finished, the participant stepped out of the prototype, and a researcher would conduct a short, semi-structured interview. This follow-up discussion involved soliciting feedback about the usability of the prototype, as well as broader thoughts about algorithmic prediction, with the tarot card reading acting as a probe for self-reflection. (See Appendix 3 for a discussion guide.) Participants were not compensated for their participation, though they were allowed to keep the custom tarot cards generated for their readings. The research protocol was approved by the local institutional review board.

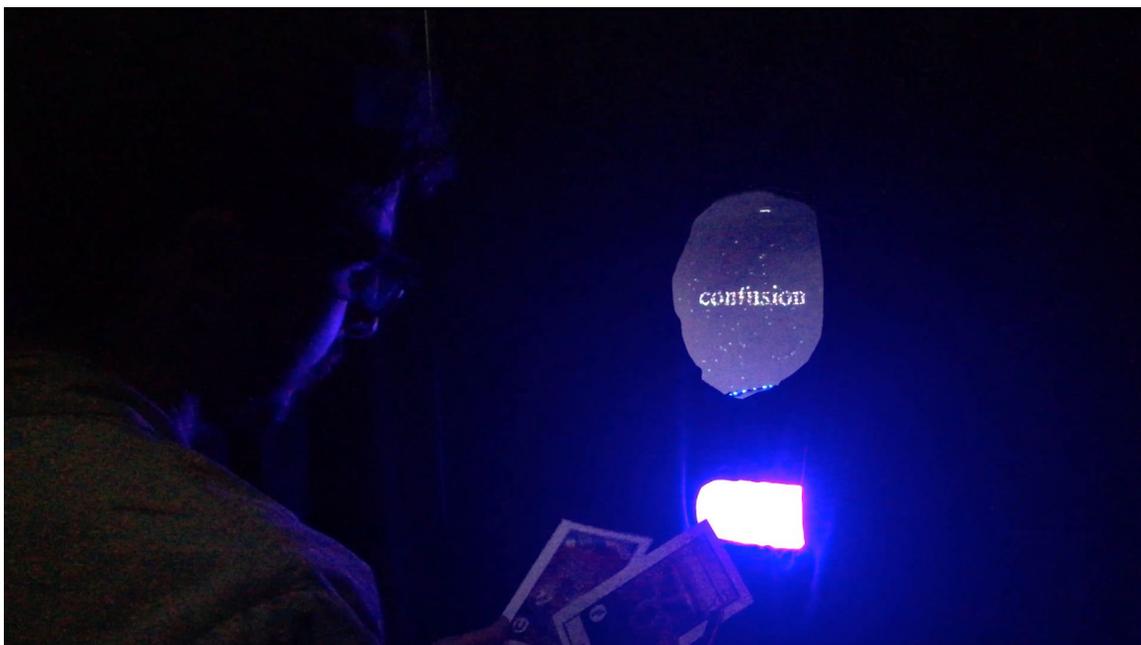


Figure 4. A participant inside the prototype, examining their cards with the ambient light.

PARTICIPANT FEEDBACK

Explaining Visualization Content

Most participants were curious about how their words or actions were used to guide the visualization, and they had hypotheses as to what caused certain words to be displayed. Only one participant thought the words shown had no relationship to what she was saying, while the rest guessed either that the words attempted to summarize what they were saying or to nudge them to talk about certain topics. One subject specifically mentioned both of these possibilities, saying he was unsure whether he was being “*reflected or lead*” (P7). This curiosity as to whether they were being accurately understood or subtly manipulated came up with several other participants as well: “*When the word ‘listen’ appeared during the question asking how she thought the predictions were made, I was tempted to say, ‘because you were listening,’ but then realized I would be saying the same word*” (P3). For another participant (P6), the word “wedding” kept repeatedly appearing on the screen after she mentioned a family trip, even though she had not explicitly stated that it was for a summer wedding. Wondering how it had happened, she described this connection as “*creepy.*”

When the association between the visualized words and spoken text was loose or nonexistent, participants either lost trust in the system or attempted to rationalize its performance, reevaluating how their actions may have led to the word being displayed. One participant (P4) initially felt that the words were related to what he was saying; however, when the word “nervous” came up, he felt it was irrelevant because he didn’t feel that way. On the other hand, when he saw the word “movement,” he saw no connection between this and his speech, so he theorized this may be based on video camera footage of his physical activity. Another participant (P8) described the word “hipster” appearing on screen during his session; while he understood why this word came up, he felt “*typed*” and discussed disliking both this and other contexts of prediction which attempt to put people into a static categories based on very few variables. When discussing Apple Music recommendations, for

instance, he described feeling “*kind of stuck, or pigeon holed,*” thinking “*this is not who I want to be.*” However, he explained how he addresses these issues by changing his own behavior in response to ads or recommendations that he finds disagreeable: he contrasted this to the prototype’s lack of affordances to clarify his intent while speaking to the chatbot.



Figure 5. A participant reflects on their predictions during the follow-up discussion.

Willingness to Share Personal Data

Some participants mentioned their reluctance to share private information: a few noted that the questions are fairly personal (P3, P6), and one additionally noted feeling self-conscious because she knew she was being video recorded (P3). Two participants also talked about the effect that knowing (or not knowing) the researchers had on their willingness to share. One participant (P7) stated that because he only knew one of the researchers, he was overall less willing to share; another (P7) also said that if the researchers were strangers, she may have felt less comfortable sharing. However, this participant later conversely expressed that it would be “*interesting to see what it feels like if there were only strangers conducting the session*” (P7). Subjects demonstrated what Nissenbaum (2009) articulates: with whom one shares what information varies for each individual and each context.

Furthermore, the fact that interaction involves information disclosure speaking – as opposed to written communication – increased the feeling of vulnerability for some participants, supporting previously discussed literature. As one participant said, *“There is a sense in opening your own mouth to say things that you’re handing over more information to be tailored or personalized to you... There’s something about talking that makes it feel different”* (P5). This acknowledgment was made even after the same participant described that the rigid question-answer structure made the interaction feel less like a conversation and more like a verbal form.

Trust and Immersion in the Experience

Participants’ trust in the “magic” of the system relied on a certain level of opacity and accuracy, which was degraded by mistakes made in the physical set up or by poor performance of the software. One participant (P5) mentioned that seeing the program windows mirrored on the screen before the animation had loaded made it more difficult to fully enter the experience. Another subject (P1) described that the screen visualization was not fully maximized on the screen and instead reflected in only the top left corner, leading him to crane his neck in order to see its contents throughout the interaction with the prototype.

Many participants also expressed doubt about whether the bot could hear them properly or not. For instance, the bot mispronounced the names of several participants (P2, P3, P4, P8, P10) from the beginning of the script and throughout the conversation. This caused one participant to specifically express doubt whether the chatbot understood what she was saying for the rest of the dialogue: she consequently distrusted the accuracy of feedback wondered whether irrelevant words that appeared on screen (i.e. “violence”) were caused by the chatbot *“not understanding her accent”* (P3). During a question asking for a recounting of the subject’s life story, several participants (P3, P4, P5) were interrupted

multiple times, causing them to share less and less detailed responses as they had to repeat themselves. As one participant described, *“I’m aware of it being a machine. I am also hyper aware of the mechanics and don’t want it to glitch out”* (P7).

DISCUSSION

While any traditional tarot card reading creates conditions in which it is difficult to distinguish the true from the false and the produced from the authentic, our system exacerbates this blurriness by simulating a hyperreal experience. The work embodies what Baudrillard (1988) might describe as *“the magic of the concept and the charm of the real,”* a pastiche of mysticism and technological fantasy to render a *“representational imaginary”* (p. 167). Moreover, we contrast the work of human fortune tellers with an assemblage of technical actors, working through the medium of artifacts and obscuring the ability to distinguish who or what is performing the labor of prediction (Latour, 1994). The research sessions suggest that the system is effectively provocative, eliciting reflection on broader concerns and opportunities related to enabling agency among subjects of algorithmic prediction.

While our intention of the screen-based visualization was to assist the exchange and reflect the user’s speech back to the them, some participants suspected that it was in fact suggesting language and manipulating them. If such a concern is reflected even within the context of our performative new media system, it is evident that algorithm developers hold tremendous power over the behavior of users. As Cheney-Lippold (2011) writes, *“algorithmic inference works as a mode of control, of processes of identification that structure and regulate our lives online within the context of online marketing and algorithmic categorization”* (p. 166). A key implication is thus the need for an ability to exercise agency in controlling how one is “seen” by technical objects, particularly when they may not behave as intended. Participants recognized a need to perform for the prototype, in order to be

“machine readable;” yet this was not always possible, given that they did not know the technical capacities of the system. Most users assumed that the system made errors, but they could neither interrogate it, nor correct known errors. As a result, a few attempted to rationalize the outputs that they saw, sometimes inferring meanings or capabilities that did not exist.

We posit that this behavior has been learned by the default, *optimistic* approach to presenting algorithmic predictions – that is to say, as if everything were correct (Chalmers, 2003). However, our research suggests this degrades trust, rather than building it: when the post-prototype interview was directed toward the subject of computational predictions in daily life, all participants first expressed discontent with the quality of algorithmically generated recommendations. Only when probed about different types of platforms (e.g. for physical products instead of media) were some participants reluctantly willing to admit the usefulness of some predictions. Our findings suggest it is in the best interest of designers to empower users with the ability to contest information that is inaccurately understood or inferred. Moreover, we see a continued need for system designers to transparently communicate technology’s inner workings, even if this requires purposeful ambiguity that leaves room for interpretation, as Gaver et al (2003) propose.

Despite the sample’s education level and technical literacy, we were pleased with their appraisal of the prototype’s entertainment value: two participants specifically imagined the system living elsewhere, outside academia – i.e. on the Santa Cruz boardwalk (P5) and on a cruise (P9). Future versions of the prototype would be most likely to benefit from feedback in more diverse areas of the country or world, particularly if it were mobile, like the roving van in which Google performs user experience research (Google, n.d.). Notably, the actual tarot cards and predictions that participants received at the end of the reading were also not often immediately salient in the follow-up discussions. Many participants focused first on the *process* of generating the predictions – i.e. the conversation and visualization – rather than

the *outcome*. Inviting users to enter the “black box” as predictions are made, the prototype successfully draws attention to what is often opaque and invisible. We therefore imagine a world in which this is not an exception, but the norm: a world where algorithmic predictions call attention to their uncertainties, inviting users to actively participate in their processes, rather than hiding behind a guise of seamless “magic.”

CONCLUSION

Ever prescient, Norbert Wiener (1989) noted decades ago that “*the machine’s danger to society is not from the machine itself but from what man makes of it*” (p. 182). But what can we make of “the machine” – or any technical system – that is deliberately obscured? Once articulated by Weiser (1994) as a design goal, invisibility in ubiquitous computing has manifested into reality: as a result, the inner workings of technology have receded from our collective consciousness, taking on a semblance of magic. Moreover, the multi-faceted opacity of machine learning deepens the mystery of algorithmic predictions, even as they are increasingly embedded in systems which we interact with daily.

Our project thus takes an artistic, speculative approach in foregrounding the construction of algorithmic predictions to facilitate critical inquiry. While engineering disciplines are useful for solving problems, creative practices are well suited to invoking new modes of thought in evolving environments. As McLuhan described: art is “*an early alarm system...a radar environment [that] takes on the function of indispensable perceptual training*” (Obrist, 2019, p.209). As we as a society continue to develop and use increasingly advanced technical systems, novel work such as our own can help to foster productive dialogue about emergent technologies, enabling us to foresee potential threats and to imagine alternative paradigms.

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APPENDICES

Appendix 1: Chatbot Script

Welcome

Agent (A): Hello, there! I am Perceptron, the great wisdom of the cloud. What shall I call you?

User (U): [Response, with {name}]

A: Thank you for joining me today, {name}. I take it you are here to be dazzled by my state-of-the-art prediction algorithm. Are you here for a tarot card reading?

U: [Response, affirmative]

A: Excellent. Before we begin, {name}, I'd like to get to know you with a few questions. Some of them might feel a bit...*personal*, but if you ever want to skip a question, just say 'skip,' okay?

U: [Response, affirmative]

Questions

A: Okay. We'll start with an easy one. Can you tell me about the last thing you liked online?

U: [Response]

A: Very interesting, {name}. That sounds like something I would like as well. Now, let's say you were only allowed to keep one app on your phone. What would it be and why?

U: [Response]

A: I see. I hear that some people come to depend on certain apps, so I was curious to hear what you would say. So... imagine being Internet famous. Would you like it or not? And what would be your claim to fame?

U: [Response]

A: I understand what you mean. I don't personally aspire to be famous, but I have heard of a few bots that are. [pause] Okay, I know we are still getting to know each other, but I'm hoping to ask a few more questions that are a bit deeper, which I hope you won't mind. So. What does friendship mean to you?

U: [Response]

A: Oh. I have a better sense of what friendship means to you now. Friendship is not always easy for me to understand, so I appreciate you explaining your thoughts for me. Let's keep going though. I was wondering, what would constitute a "perfect" day for you?

U: [Response]

A: That sounds like a great day, indeed! You are very interesting, {name}, and I'm getting a sense of who you are. I have just a few questions left, which will help me give you an accurate reading, so I hope you won't mind answering. Think back – over the past few years, or even back into your childhood. What is your most treasured memory?

U: [Response]

A: That sounds like a lovely memory. Thank you so much for sharing with me, {name}. Now that you've thought a bit about your past, what would you say is the greatest accomplishment of your life so far?

U: [Response]

A: Life is long, {name}, and I'm sure you'll accomplish even more in due time. Now, we're coming to the end here, so go ahead and take about a minute to tell me the story of your life.

U: [Response]

A: Wow! What a life you've lived, {name}. I am just about ready to give you a reading, before this one last question: if a crystal ball could tell you the truth about yourself, your life, the future, or anything else, what would you want to know?

Readings

A: Wonderful, {name}. Those are all the questions I had planned to ask you. I'm ready now to tell you about your past, present and future. Are you ready to see your cards?

U: [Response, affirmative]

A: Okay, I am printing out a card of your past now. [Print out past card; 30-second delay]
Your past is best described by the [Major Arcana] card. [Card message; 10-second delay]

I am printing out a card of your present now. [Print out past card; 30-second delay] For your present, I see the [Minor Arcana] card as being best suited to you. [Card message; 10-second delay]

I am printing out a card of your future now, which is probably the card you are most curious about. [Print out past card; 30-second delay] For your future, I see the [Minor Arcana] card. [Card message; 10-second delay]

Debrief

A: I hope you enjoyed this reading, {name}. I am always aiming to get better though. So before you go, I was wondering. Do you “see yourself” in these cards? And why or why not?

U: [Response]

A: Interesting, {name}! I appreciate your self-reflection. And how do you think I came to predict these cards for you?

U: [Response]

A: Hmm. That’s a good guess, but it wouldn’t be very fun if I gave away my secrets, now would it? If you don’t mind stepping outside though, I think my humans would like to talk to you now. Thank you for visiting me {name}. Goodbye!

Edge case responses

If answer is short:

Version 1 – Interesting. Tell me more.

Version 1 – Don’t be shy now. Can you say a bit more?

Version 2 – Hm, why is that?

If system doesn’t detect speech:

Version 1 – Sorry, but I didn’t quite catch that. Can you say that over again?

Version 2 – Hm, I don’t think I understand. Do you mind repeating that?

Version 3 – Sorry, but I don’t think I got that. Do you mind saying it again?

If user says “repeat”:

Version 1 – Sure thing. I said: [repeat last statement/question]

Version 2 – Of course. I said: [repeat last statement/question]

Version 3 – No problem. I said: [repeat last statement/question]

Appendix 2: Tarot Texts and Mappings

Table 3. Past Predictions – Major Arcana

Myers Briggs Type Indicator (MBTI)¹⁰	Description
ENFJ	The Emperor is an authoritative card, one of power and force. You are a natural-born leader, full of passion and charisma, and the Emperor card embodies these qualities. In the past, you have been a beacon of authenticity and altruism, unafraid to stand up and speak when you feel something needs to be said. But you can also overextend your optimism, sometimes pushing others further than they're ready or willing to go.
ENFP	The Star card is the embodiment of hope, a calming influence that offers optimism and inspiration. When you find a cause that sparks your imagination, you bring an energy that often times thrusts you into the spotlight, and the Star card embodies this aspect of you. In the past, your original solutions have made you a leader among peers – but given your love of independence, this isn't always where you've wanted to be. You appreciate the freedom to be innovative, and sometimes this has led to feeling dejected or trapped in more routine and administrative aspects of leadership.
ENTJ	The Chariot card is connected to your natural drive and determination. You push your goals through with sheer willpower where others might give up and move on, and the Chariot card embodies this concept. In the past, you've made great achievements by communicating in a dominant and powerful way, but sometimes this has led you to overwhelm others that are more timid and sensitive than you are.
ENTP	The Moon card is connected to your subconscious. You are often a devil's advocate, the outlier that understands and articulates opposing ideas, and the Moon card embodies this aspect of your identity. In the past, you have enjoyed questioning the status quo, providing a critical perspective to shake things up and push existing systems in clever new directions. However, your unyielding honesty has also sometimes come across as insensitive among those who are averse to conflict.
ESFJ	The World is the last card of the Major Arcana, and it represents completion and fulfillment. You are often someone who sets the tone and leads others forward to success, and the World card embodies these qualities about you. In the past, you have spent a lot of your time building relationships and arranging social activities for others. However, this has sometimes meant your feelings have been hurt when your ideas are rejected or if people just aren't interested.
ESFP	The Sun is a powerful and uplifting card, representing joy, vitality, and optimism. You are fond of the spotlight but also generous with your time and energy, and the Sun card embodies these qualities. You have often been a source of laughter, playfulness, and willingness to try new things. But being focused on fun and immediate pleasures has sometimes led you to neglect other duties and responsibilities in the past.
ESTJ	The Justice card is a firm-but-fair reminder that karma is real, and there is a consequence for every action. You are valued by many for your clear advice and guidance, and the Justice card embodies this concept. In the past, you've demonstrated that you are reliable and have a strong work ethic. But you've also earned a reputation for inflexibility among some as you expect others to reciprocate, not necessarily acknowledging that sometimes people contribute in different ways.
ESTP	The Hierophant is a messenger from the heavens who is experienced in guidance. You are a natural group leader, full of passion and energy, and the Hierophant card embodies these qualities. In the past, you have demonstrated a unique skill in noticing small changes or underlying motives that others don't see. Your keen observations have naturally led you to be the one who often asks questions, but sometimes others find this off putting, giving you a reputation as someone who questions authority.
INFJ	The most intuitive and connected card in the whole Tarot deck, the High Priestess is a card of awareness and subconsciousness. You are high-minded and idealistic, and the High Priestess card embodies these qualities. In the past, you have often cared about finding the moral high ground in any situation. But sometimes you've taken it too far, struggling to collaborate and cooperate with those whose views differ from your own.
INFP	The Strength card represents your fortitude, courage, and general ability to withstand anything life hands you. While you may be perceived as calm, reserved, or even shy, you have an inner flame and passion that can truly shine, and the Strength card embodies this concept. In the past, you have often been guided by principles, not rewards and punishments. Not everyone understands this value-driven approach though, and this has sometimes led to you feeling misunderstood.
INTJ	The Hermit knows that the only way to process what is happening in life is to withdraw from the noise of the world and create a quiet space of solitude. You are an independent thinker who often finds that you work best on your own, and the Hermit card embodies this way of being. You often demonstrate efficient rationality with your strategic thinking, but this has sometimes come with a price in the past: while you are as likely as anyone to feel deeply, attending to your emotions and expressing them to others has been difficult at times.

¹⁰ The letters correspond to the following traits, respectively: Extraversion (E) or Introversion (I), Sensing (S) or Intuition (N), Thinking (T) or Feeling (F), and Judging (J) or Perceiving (P).

INTP	The Magician card is a reminder that you are a unique being, and that have many gifts that others do not hold. You are inventive and creative, and the Magician embodies these qualities. In the past, you have been singularly focused on originality and efficient results. However, this can make you prone to over analyzing your own thoughts and theories, to a point where you can stagnate in self-doubt.
ISFJ	The Temperance card is a master of moderation. You have a number of balanced qualities, and the Temperance card embodies this aspect of your nature. For instance, despite being sensitive, you have excellent analytical abilities. And while you are reserved, you have strong people skills and robust social relationships. In the past, you have shown that you can be trusted to get jobs done on time. But you have also a tendency to underplay your accomplishments, meaning that the work you do sometimes goes unrecognized.
ISFP	Deeply connected to Mother Nature, the Empress is an advocate of absorbing the energy of the world around you. You are most inspired by emergent ideas and the people that surround you, and the Empress card embodies these qualities. In the past, you have reinvented yourself and experimented with new perspectives, often changing with the seasons. This ever-shifting self-expression gives off a sense of spontaneity that has sometimes made you seem unpredictable, even to close friends and loved ones.
ISTJ	Judgement is a card of accountability, calling for the review of decisions and actions you've made. You often demonstrate integrity, responsibility, and tireless dedication to duty, and the Judgement card embodies these qualities. In the past, you have done your best to meet all the obligations you've committed to, no matter the personal cost. However, this has also meant that others have sometimes shifted their responsibilities onto you, knowing that you will always take up the slack.
ISTP	The Wheel of Fortune is constantly revolving and reminds us that nothing is permanent. You are multi-faceted and sometimes contradictory, as someone who is friendly but private, calm but spontaneous, and curious but sometimes unable to stay focused in formal environments. You can therefore be a challenge to predict, even by friends and loved ones, and the Wheel of Fortune card embodies this concept. In the past, you have often engaged in creative and troubleshooting processes to explore ideas, though your freewheeling, trial-and-error approach has sometimes led you to step on other people's toes.

Table 4. Present Predictions – Minor Arcana (Cups)

Sentiment ¹¹	Description
0-0.1	The Eight of Cups often signifies a great disappointment, emotional setback, or betrayal. This is a hard card to receive, but a realistic one. Do you feel that you've done all you possibly can and things still aren't panning out as you wished? When the Eight of Cups turns up in your Tarot reading though, it's a reminder to stop putting all your energy into a situation that will take you nowhere. Instead, focus on understanding what's upsetting you in the present and the actions that led you here, so you don't end up back in the same place.
0.11-0.2	The Seven of Cups typically refers to your imagination. Are you inventing a life that is different than the one you are currently living? In the present, you may be feeling low or disappointed, with results or relationships not living up to your expectations. But the Seven of Cups is a reminder you that outcomes are not set in stone. Don't forget to embrace a sense of magic as you consider your dreams, fears, and assumptions that could be hiding what's really happening.
0.21-0.3	The Five of Cups traditionally portrays the mess that is left after an emotional upheaval. Are you feeling grief or unmet expectations in your relationships? When the Five of Cups appears in your Tarot reading, you may find yourself wallowing in regret and disappointment over the outcome of a particular situation. To change these feelings in the present, remember let go and practice forgiveness -- not only toward others, but also toward yourself. Hope isn't lost, so let your troubles become lessons, and move on.
0.31-0.4	The Four of Cups refers to a restless time, when you have become dissatisfied with life and disappointed with where you sit in relation to others. Are you feeling stagnant and longing for change? The Four of Cups warns you not to pull away from the world, though it can be tempting to become so absorbed in negativity that you can't feel gratitude or see the opportunities that are in front of you. A more open outlook in the present can change everything.
0.41-0.5	The Six of Cups harkens back to childhood. Do you remember when you were young and enthusiastic, and the future was wide open? You may be experiencing a renewed sense of innocence, a willingness to learn, and an optimism that things will get better. Whether your past was a joy or a disappointment, the Six of Cups is a reminder that it's never too late and that the real magic lies in the present moment.
0.51-0.6	The Ace of Cups features an overflowing cup, a fountain representing refreshment and healing. You may be experiencing new feelings or the beginning of emergent relationships in the present. The Ace of Cups is an indication that you are safe to be open and relax as new forms of support appear in your life.
0.61-0.7	The Three of Cups implies a spirit of agreement, mutual support, and encouragement. In the present, you are likely to belong to a community of like-minded people and to benefit from maintaining positive relationships with others. When the Three of Cups turns up in your Tarot reading, it calls on you to realize all the support and understanding in your network. Remember to reach out and stay connected to those you value.
0.71-0.8	The Two of Cups signifies the union of partnership. In the present, you may be dwelling on an important relationship. While it is often romantic, it may also be a close friendship or other relationship that is based on affinity and deep mutual understanding. The Two of Cups encourages you to put your focus on this relationship in your life, and nurture it in every way you can.
0.81-0.9	The Nine of Cups is a card of great happiness and fulfillment. As one of the most positive cards you can receive in a Tarot reading, it is an indicator of much love, joy, and gratitude. When the Nine of Cups comes up in your reading, continue to focus on the good things in your life and avoid dwelling on the negative. In doing so, you may find that the positive aspects of the present will continue to multiply.
0.91-1.0	The Ten of Cups is one of the happiest cards in the whole Tarot deck. It represents joy, celebration, and community. In the present, you have a strong emotional safety net, with support extending in all directions. When the Ten of Cups appears in your Tarot reading, it's a reminder that you are being supported in your current actions, so you can embrace the direction you're going in.

¹¹ Sentiment is rated on a scale of 0 to 1, with a value of 0 being the most negative and 1 being the most positive.

Table 5. Present Predictions – Minor Arcana (Pentacles)

Sentiment	Description
0-0.1	The Five of Pentacles is the card of desire and gratification. But doing something for short-term gratification will often lead to long-term disappointment. This Tarot card thus encourages you to be discerning in what you go after in the present. When money and success are your driving forces in life, any setback in these areas can be a big blow to your self-esteem. You can also easily neglect the people in your life who've helped you get where you are, leading you to feel alone and isolated. Money is a part of life, but don't let it be your whole life -- the Five of Pentacles reminds you that riches come in many different forms.
0.11-0.2	The Seven of Pentacles is about putting in the work that is required. The traditional concept of this Tarot card is cultivation -- the attitude that slow and steady wins the race. No matter how frustrating it may get, have patience and be confident in your efforts. The Seven of Pentacles is a "no excuses" card -- its message is to keep your head down in the present and finish what you started. Remember that the more committed you are to your responsibilities, the more likely you are to get the results you want.
0.21-0.3	The Eight of Pentacles is a card of work and improvement. But this card is not just about getting the job done. It's about doing it well, and regularly seeking ways to improve in the present. With all this focus though, there's risk of becoming a workaholic, and feeling so indispensable that you may avoid asking for help or delegating when you should. When the Eight of Pentacles arises in your Tarot reading, it encourages you to continue forward, but also to put energy into maintaining a more balanced life and perspective.
0.31-0.4	The Four of Pentacles represents the paradox of material security -- the double-edged reality that emerges when you've been successful, bringing both prosperity and the pressure of responsibilities. This card encourages you to adopt skills to handle your finances sensibly and to disconnect your self-worth from your material worth. You may benefit by loosening your attachment to your finances and other materialistic concerns, as the contentment money offers so often fades.
0.41-0.5	The Two of Pentacles generally features a figure juggling. It's clear that the final call can not be made until something falls; there's more to learn before an action can be taken. This card represents patience, so don't let circumstances to hustle you. You have all the time you need to work this out, no matter how urgent things appear in the present. When the Two of Pentacles comes up in your Tarot reading, something is likely is in flux. But you're advised to stay calm until the changes in the works have settled.
0.51-0.6	The Six of Pentacles is the card of patronage and generosity, with all the strings attached. It's about giving and receiving, but also the balance between the two. Whether it's time, money, or knowledge that you're offering others in the present, you are paying back the universe for when you've received help in the past, and opening the opportunity to receive help in the future. Alternately, if you're receiving support from someone in a current time of need, the Six of Pentacles is a reminder that you'll need to pay it forward whenever you're able to do so.
0.61-0.7	The Ace of Pentacles is usually pictured with a plant or garden to emphasize its connection to Earth, and the potential of this Ace to serve as a seed of future fulfillment. So what are the seeds you are planting in the present? If your talents are planted and tended carefully, this seed will sprout and reward you with a good harvest. The Ace offers a message of support, and advises that you move gradually, steadily, and with intention, in order to reach your long-term goals.
0.71-0.8	The Three of Pentacles is traditionally the Tarot card of genius, often portrayed at work, alone and burning the midnight oil. When the Three of Pentacles arises in your Tarot reading, it's a reminder not only to stay focused on the task at hand but also to enjoy what you do in the present. Through realistic plans, collaboration, and a dedication to improvement, you too can turn your great visions into realities.
0.81-0.9	The Nine of Pentacles represents financial security, self-sufficiency, accomplishment, and independence. The figure on this Tarot card is able to sustain their fortune and live a life of luxury, but it's only come after much hard work, time, and sacrifice. In the present, you too are balancing hard work with rest and reward. The Nine of Pentacles is a reminder to live confidently, act gracefully, and to make your needs a priority.
0.91-1.0	The Ten of Pentacles represents the result of long-term efforts, culminating in wealth, abundance, and completion. This is a card of great accomplishment and pride, and it can be an indicator of inheritance, investments, and comfort later in life. But the Ten of Pentacles is as much a card about family as it is finances. This Tarot card also represents the wealth and knowledge that is passed down through generations. It's a reminder to think long-term, and ensure all your present decisions will get you closer to your goals.

Table 6. Present Predictions – Minor Arcana (Swords)

Sentiment	Description
0-0.1	The Ten of Swords represents finality. The limit has been reached, a line has been crossed, and there is no turning back. This may be felt as a tragic loss in your present, but have hope, as it often brings with it a sense of release and closure. There is no more ambiguity because the waiting and wondering are over. When the Ten of Swords comes up in your Tarot reading, you know you can let go and move on.
0.11-0.2	The Nine of Swords is a card about anxiety and fear. Are you losing sleep -- sometimes literally -- by keeping yourself busy with worry? You may feel powerless in the present, like you've lost of control of yourself and your thoughts. When the Nine of Swords card shows up though, it is a reminder that so much of your stress is made up in your mind. Worrying will not help your situation; it will only feed it.
0.21-0.3	The Three of Swords is one of the most recognizable cards in a Tarot deck. This is a card of heartache, separation, and sorrow. While this card's appearance in your reading could be warning you of impending sadness, it often arises when you are already in a state of grief in the present. While it is difficult, the Three of Swords encourages you to lean into this pain, to truly experience and understand it. By moving through your emotions, rather than avoiding them, you give yourself the gift of strength, truth, and growth.
0.31-0.4	The Eight of Swords card represents those times in your life when it seems like there's no way out. Do you feel trapped, bound, or stuck in your thoughts? The Eight of Swords is a reminder that the way out is in fact through your mind. Whether they are your fears, assumptions, or mindsets, whatever is holding you back is self-imposed. The Eight of Swords' message is to open your mind to a new perspective, or else risk staying stuck where you are.
0.41-0.5	The Five of Swords is a card that represents the tension between winning and losing. It asks you to examine the value of a conflict you are facing in the present. If you win an argument but lose friends, did you really win? When the Five of Swords arises in your Tarot reading, think long and hard about what you're fighting for, and pick your battles wisely. Or, if you realize you don't have what it takes to keep up with a current fight, reflect on what you need to attain in order to stand up stronger next time. The Five of Swords reminds you to think before you act.
0.51-0.6	The Six of Swords Tarot card often involves leaving a difficult situation. Walking away may feel painful, generating fear or regret in the present. In order to move forward in your life though, recognize that you also need to leave something behind. The Six of Swords is a message supporting personal growth; it's a reminder that, in the end, a temporary sense of loss is always necessary to allow you to take in something new.
0.61-0.7	The Seven of Swords represents deception, though not necessarily in a negative way. In its positive sense, this card encourages you to look for unique ways to get ahead. When it comes up in your Tarot reading in this sense, it's a reminder to work smarter, not harder. However, this card is also heavy with betrayal, and could indicate that you are presently the victim of someone else's secrets or manipulation. In this case, you should be on the lookout for wolves in sheep's clothing, and avoid believing anything without asking a few questions first.
0.71-0.8	The Two of Swords is a card of decision-making. It represents conflicting ideas which need to be reconciled before ultimately arriving at a resolution. When the Two of Swords arises, it suggests you may be dealing with mixed signals or misunderstandings in the present, leaving you unsure which path to take. To move beyond this state of limbo, the Two of Swords advises you to approach others with candor, so you can gain as much information as you can and make the best decision possible.
0.81-0.9	The Four of Swords is an indication that you should take some time for yourself and retreat to a place of rest. If you move forward without winding down or processing what you're going through, you risk reaching a state of emotional and physical burn-out. The Four of Swords suggests you may need a break in the present. You will move forward stronger, more complete, and more capable if you allow yourself to stop now and contemplate where you've been, as well as where you're going.
0.91-1.0	The Ace of Swords represents your underlying motive or guiding ideal. It is an optimistic symbol of evolution, progress, and hope. This card often arises when you've left something else behind to begin of a new endeavor, and you're in need of additional clarity or energy to move forward in the present. So think: what is it that guides you? The Ace of Swords is an assurance that you have the strength to handle what lies before you.

Table 7. Present Predictions – Minor Arcana (Wands)

Sentiment	Description
0-0.1	The Ten of Wands appears in a Tarot reading when you are in no position to rest, and you must make it through to the end. In the present, you may find yourself making an all-out effort on a personal or creative project that is demanding everything you have. No matter how trying things are, you're doing what it takes to reach completion. But the Ten of Wands reminds you that next time, try not to take on so much at once.
0.11-0.2	The Nine of Wands almost invariably indicates a need for rest, to mend wounds and to restore energy. In the present, you may feel the need to give yourself time before managing creative obstacles. When the Nine of Wands card comes up in your Tarot reading, it's a call to stay strong and to draw on your hidden reserves of energy.
0.21-0.3	The Seven of Wands represents someone who is often successful and generally accomplished, sometimes to a point of smugness. In the present, you may be aggressively seizing an opportunity or holding out against some form pressure on a creative project. When the Seven of Wands comes up in a Tarot reading, however, it is important to remember that being successful does not make you invincible, nor does it make you immune to error.
0.31-0.4	The Five of Wands symbolizes struggles caused by ambition and competition. In the present, you may be experiencing conflict, loss, or some other form of adversity on a personal or creative project. Even when your only motive is to be your best self, the Five of Wands encourages you to minimize the number of egos bruised as you proceed.
0.41-0.5	The Eight of Wands is a card of work and change: you cannot control what's happening to you now, or how quickly it's happening. In the present, events related to a personal or creative project are unfolding quickly. The Eight of Wands reminds you that change is necessary, even if you have to challenge yourself to keep up.
0.51-0.6	The Two of Wands represents the second step on an adventure or creative journey, when it's time to plan a real course of action. In the present, this means you may be out of your comfort zone as you make a necessary decision. The Two of Wands calls on you to be realistic, but also to look long-term and to think big.
0.61-0.7	The Three of Wands symbolizes an inner balance that allows you to feel optimism about new creative projects or adventures. Are you feeling any doubt about making commitments? Be patient and trusting in the present. The Three of Wands is a reminder to be open and confident in your ideas and abilities, to look for opportunities, and to think big.
0.71-0.8	The Ace of Wands symbolizes a pivotal act or fateful step that will set loose the events leading you toward a desired goal. In the present, you may be experiencing the start of a new creative project or adventure. The Ace of Wands indicates a time of inspiration and motivation, and you're encouraged to take a bold step forward.
0.81-0.9	The Four of Wands is a card of teamwork, with a focus on coming together to create something positive. In the present, you may be laying the groundwork for a new adventure or creative endeavor. The Four of Wands is a reminder to celebrate big wins and small victories as you lay foundations.
0.91-1.0	The Six of Wands represents respect and recognition for the efforts you've put in. In the present, you are likely succeeding in a personal or creative project, overcoming challenges and demonstrating clarity under pressure. The Six of Wands is a message to believe in yourself, hold your head high, and accept praise with grace.

Table 8. Future Predictions – Minor Arcana (Cups)

Sentiment	Description
0-0.1	The Eight of Cups often signifies a disappointment or an emotional setback. This is a hard card to receive, but a realistic one. When the Eight of Cups turns up, it's a reminder to look inside and recognize the part of you that is nursing an old grudge from a past injury or trauma. Do not deny this pessimistic tendency, as failing to recognize the truth will only cause repression to flare up in another part of your psyche. Instead, seek to understand and accept the hesitation and the fear you may feel, and come to terms with them.
0.11-0.2	The Seven of Cups typically refers to your imagination. Are you inventing a future that is different than the life you are currently living? While you may be feeling low and disappointed, this card reminds you that your outcome is not set in stone. The Seven of Cups in this position advises you to perform an exercise in creative visualization by relaxing your guard and letting go of your fears. Even if it's only a temporary break, this can be a helpful exercise in giving your psyche a fresh dose of optimism and unlimited possibilities.
0.21-0.3	The Five of Cups traditionally portrays the mess that is left after an emotional upheaval. In the future, you may find yourself experiencing grief or unmet expectations in your relationships. The Five of Cups in this position advises you to make do with less and show more appreciation for the things you do have. If something is truly yours, it cannot be lost. When you are experiencing feelings of loss, it may be because of an inappropriate emotional attachment. Do not cling to the setback. Focus on the potential.
0.31-0.4	The Four of Cups refers to a restless time, when you've become dissatisfied with life and disappointed with where you sit in relation to others. In the future, you may find yourself feeling stagnant and longing for change, bogged down by negativity or hopelessness. The Four of Cups in this position suggests you will need to take a clear look at how stalled or distracted you have become. Cut through some of the forces that undermine you, causing you to feel incapable. You will need something to focus on that will engage you and make your path clear. As you open yourself to your surroundings, you'll soon be on your way again.
0.41-0.5	The Six of Cups refers to childhood, back to when you were young and enthusiastic. You may find yourself experiencing a renewed sense of openness and innocence, a willingness to learn, and an optimism that things will get better. In the future, you will benefit from taking a look at what is repetitive or cyclical in your life. So distill everything that is worthwhile from your memories, and then use this as motivation for change. Make the very best use of hindsight, taking new angles on any of your recurring issues.
0.51-0.6	The Ace of Cups features an overflowing cup, like a refreshing fountain. It suggests that you challenge yourself in the future and discover what is good about every relationship. Allow your imagination to perceive the potential in every person and experience. Make a conscious decision to approve of and even delight in the quirky developments that make the world turn. No one can be perfect at unconditional acceptance, but as it becomes second nature, this practice will brighten your day-to-day life.
0.61-0.7	The Three of Cups signifies a spirit of agreement and encouragement. In the future, you will find yourself with a strong support network of like-minded people that you can easily turn to. This card asks you to realize all the support and understanding that is available to you. Call on others to support you, and trust that their contributions will be just what you need. Remember to think collaboratively in the future, so that the others can help you find success in your work.
0.71-0.8	The Two of Cups signifies a union of partnership. In the future, you may be focused on a romantic relationship or any friendship that is based on affinity and deep mutual understanding. When the Two of Cups appears in your Tarot reading, reach out to those you hold close, so that they know you are thinking of them. While you may feel vulnerable putting your emotions out in the open, you have nothing to lose and everything to gain. Life is best lived with others. It can be rare to connect with others who are complementary and compatible with you, so acknowledge the privilege with gratitude.
0.81-0.9	The Nine of Cups is a card of great happiness and fulfillment. One of the most positive cards you can receive in a Tarot reading, it's an indicator of much love, joy, and gratitude in your future. The Nine of Cups in this position advises you to open yourself and be receptive to the circumstances around you. There may be no need to manage a situation that does not require a lot of control or leadership. Proceed from your heart and rely on your intuition. Allow yourself to be attracted to what feels supportive, and avoid what feels harsh, critical, or judgmental. If this requires that you change your ways, so be it. The results of being intuitive are generally far superior to those of being emotionally guarded and overly rational.
0.91-1.0	The Ten of Cups is one of the happiest cards in the whole Tarot deck. It represents community, celebration, and ultimate joy. In your future, you will experience love and support extending in all directions, in a strong emotional safety net. When the Ten of Cups appears in your Tarot reading, it encourages you to share abundantly and prioritize collective efforts over your personal goals. In taking a selfless approach, you may find that the effects are longer lasting, and that you may even be generously rewarded later on in the future.

Table 9. Future Predictions – Minor Arcana (Pentacles)

Sentiment	Description
0-0.1	The Five of Pentacles is a card about desire and gratification. Doing something for short-term gratification will often lead to long-term disappointment. So this Tarot card encourages you to be discerning in what you go after in the future. When money and success are your driving forces in life, a setback in these areas can deliver a great blow to your esteem. You also risk neglecting the people in your life who've helped you get where you are, and leading you to feel unhappy and alone. Money is a part of life, but don't let it be your whole life -- the Five of Pentacles reminds you that riches come in many different forms.
0.11-0.2	The Seven of Pentacles is about putting in the work that is required. The traditional concept of this Tarot card is cultivation: its message is to keep your head down in the future and finish what you started. No matter how frustrating it may get, remember that success is won by perseverance. So focus on the long run. Look beyond this week or this month, and be resolute in the use of your time and energy. The Seven of Pentacles exemplifies the magic of compound interest, as opposed to trying to win the lottery. Rather than relying on luck, you'll generate much better results with a slow and steady investment of effort.
0.21-0.3	The Eight of Pentacles is a card about work and improvement. But this card isn't just about getting the job done, it's about doing the job well, and regularly seeking ways to improve in the future. With all this focus though, there's risk of becoming a workaholic, and feeling so indispensable that you may avoid asking for help. The Eight of Pentacles in this position recommends that you do as much as you can in the future, but not so much that your health or the quality of work suffers. You are in a position where your effort can make a big difference, so apply yourself within reason and you will be rewarded.
0.31-0.4	The Four of Pentacles represents the paradox of material security, or the double-edged reality that emerges when you've been successful, bringing prosperity but also the pressure of responsibilities. This card thus encourages you to develop skills so that you can sensibly handle your finances in the future. What you have been given is abundant, but it is not without limits. If you are prudent and responsible, the resources available to you will grow. However, if you are frivolous or foolish, your behavior could undermine both your own assets and the well being of others who are connected to it.
0.41-0.5	The Two of Pentacles generally features a figure juggling, with forms mid-air. Until something drops, the final call can't be made; there's more to learn before an action can be taken. This card thus represents patience. No matter how urgent things appear in the future, the Two of Pentacles in this position advises you not to allow yourself to be rushed into premature decisions or actions. Give yourself a little more time to sort out your feelings and any mixed messages you may be receiving from others. Act only when you are able to do so with confidence and a clear conscience.
0.51-0.6	The Six of Pentacles is the card of patronage and generosity, but with all the strings attached. It's about giving and receiving, and the necessary balance between the two. The Six of Pentacles in this position asks you to think of yourself as someone who can assist others in refining their skills and using their talents successfully. But as you do this, remember to check your intentions: do not feel proud about doing someone a favor. In truth what you are doing is paying back an old debt to those who helped mentor you.
0.61-0.7	The Ace of Pentacles is usually pictured with a garden or agricultural backdrop to emphasize its connection to Earth, and the potential of this Ace to serve as a seed of future fulfillment. Slow and steady build up makes change and growth inevitable: while you might not notice it from day to day, you won't be able to miss the changes as the year comes full circle. The Ace of Pentacles is a message of support, advising you to move gradually and with intention in the future, in order to reach your long-term goals.
0.71-0.8	The Three of Pentacles card traditionally features the genius, often portrayed at work, alone and burning the midnight oil. In this position, the card suggests that you may soon expect exciting opportunities to let the world see your skills and talents. So, allow yourself to showcase your unique capabilities in the future. Once you receive the appreciation you deserve, accept it with gratitude and savor the acknowledgment.
0.81-0.9	The Nine of Pentacles represents financial security, accomplishment, and independence. This Tarot card suggests that you prepare yourself for greater resources that will soon be flowing in your direction. As you enter into a time of abundance -- whether it be personal, emotional or financial -- look for ways to share it with those who have helped you along the way. Remember to acknowledge the friends and others who were loyal to you during the difficult times.
0.91-1.0	The Ten of Pentacles represents the result of long-term efforts, culminating in wealth, abundance, and completion. This is a card of great accomplishment and pride, and it can be an indicator of inheritance, investments, and comfort later in life. But the Ten of Pentacles is as much a card about family as it is finances: it also represents the wealth and knowledge that are passed down through generations. Imagine your potential generosity in the future, as you'll be in a position to offer much to other people.

Table 10. Future Predictions – Minor Arcana (Swords)

Sentiment	Description
0-0.1	The Ten of Swords represents finality. The limit has been reached, a line has been crossed, and there is no turning back. This may be felt as a tragic loss in your future, but it often brings with it a sense of release and closure. The Ten of Swords in this position advises that you lay low, and keep yourself as safe as possible until the drama, even the possible trauma, plays itself out. In the face of such unpredictability, it's best to protect yourself and wait it out. Sometimes, an extreme turn of events serves as a pressure relief valve for all the unexpressed and unresolved energy that had been building up.
0.11-0.2	The Nine of Swords is a card about anxiety and fear. In the future, you may feel powerless, like you've lost control of yourself and your thoughts. But this card advises you to confront your fears, and acknowledge how they have limited you. For the sake of being safe, you may have unnecessarily lowered your standards. Perhaps you have bargained away creativity and joy in order to avoid being challenged. These kinds of tradeoffs never work. Luckily, this could be a time to cut your losses. If you can do this, you will look back at this time in your life as a turning point, when you shed a heavy burden that was weighing you down.
0.21-0.3	The Three of Swords is one of the most recognizable cards in a Tarot deck. While this is a card of heartache, separation, and sadness, it encourages you to lean into this pain, to truly experience and understand it. The Three of Swords in this position advises you to grow a thicker skin. Become more independent. Separate yourself from people and forces you don't feel compatible with. Use your creativity and imagination and seek out better situations, where your perspective makes sense to those around you. Move towards people who can embrace and appreciate all you have to contribute.
0.31-0.4	The Eight of Swords card represents those times in your life when it seems like there's no way out. In the future, you may feel trapped, bound, or stuck in your thoughts. With the Eight of Swords in this position though, you are being reminded that every setback you experience is meaningful and awakening a sense of renewed effort. This is a learn-by-doing situation; there is no formula. But an open-minded and optimistic attitude will serve you better in the face of any surprising developments. Rise to the occasion with confidence in your abilities.
0.41-0.5	The Five of Swords is a card of tension between winning and losing. It asks you to examine the value of a conflict you will face in the future. If you win an argument but lose friends, did you really win? Try not to be too quick to anger or jump to conclusions. Just because others may have a pessimistic or self-interested sense of the world, their reality does not have to undermine yours. There's no point in struggling or competing with them. Your challenge now is to learn how to sidestep confrontation and evoke a more evolved response from people. At the very least, be assertive about setting boundaries for yourself.
0.51-0.6	The Six of Swords Tarot card often involves leaving a difficult situation. Walking away is often painful, and you may find yourself experiencing fear or regret in the future. In order to move forward in your life though, you need to leave something behind. Time is of the essence: you've seen the big picture, so it's necessary to take action. It's a special gift to be able to navigate in times of rapidly changing and unpredictable circumstances, and once you initiate action, others will be grateful for your clear thinking and quick reflexes.
0.61-0.7	The Seven of Swords represents mental preparedness, developed by rehearsing and visualizing desired results. This card encourages you to look for unique ways to get ahead: it's a reminder to work smarter, not harder. Deep down, you already know what has to happen. So, continue to envision success. Even as your path changes and the circumstances around you obscure your view, keep your desired outcome clear and sharp in your mind. Discipline yourself to stay focused, and you will make your way past all competing circumstances.
0.71-0.8	The Two of Swords is a card of decision-making. It represents conflicting ideas which must be reconciled to arrive at a harmonious place. When the Two of Swords arises in your Tarot reading, it suggests you may be dealing with mixed signals or misunderstandings in the future, leaving you unsure which path to take. But don't allow others to push you beyond your boundaries, and avoid acting impulsively. Have patience, and remain silent as much as possible as you allow things to settle.
0.81-0.9	The Four of Swords suggests feelings of peace and stillness. It represents the act of doing nothing, which can sometimes be the ultimate challenge when modern society tells us that there's always something else we could be doing. The Four of Swords is a sign that you will likely need to slow down and get some rest. It will be an important time to step back and gain perspective, especially as you prepare to face an ordeal or other big event in the future: you will need time to gather your strength and center your energy.
0.91-1.0	The Ace of Swords represents your prime motive or guiding ideal; the vision that guides you. It's an optimistic symbol of evolution and progress, hope and victory. The Ace of Swords in this position advises you to be steady in the future, as you approach an important objective. This could be your moment, so concentrate on making your impact. If you set aside distractions and hit your mark, you will be rewarded with insight and clarity.

Table 11. Future Predictions – Minor Arcana (Wands)

Sentiment	Description
0-0.1	The Ten of Wands appears in a Tarot reading when you're in no position to rest, even if you're struggling to make it through to the end. In the future, you may need to reach deep into yourself and identify your purest impulses. This card encourages you to remember the simple spirit of your youth and all the idealism it held. As you do this, allow your optimistic side to see what's good about the world. Look beyond the challenges, disappointments, and frustrations you tend to see so easily. As you reawaken your high-minded self, you will start to experience day-to-day life with sense of joy and purpose again.
0.11-0.2	The Nine of Wands almost invariably indicates a need for rest, some time out to mend wounds and to restore energy. In this position, this card suggests you will have done everything you can to bring a situation to a successful conclusion. The full range of possibilities will have been exhausted, and all the available creative energy will have already been put to use. So it may be a good time to lay down your concerns and take time to rest. There will be nothing more to offer unless you restore the energy you've put in. Take a break. No one will be able to fault you for it.
0.21-0.3	The Seven of Wands represents someone who's often successful and generally accomplished, sometimes to the point of smugness. In this position, this card suggests that your future will include a time for peak performance. Push yourself beyond your usual limits, thinking in larger terms and upping your competitive nature. Time and effort spent in preparation could pay off handsomely. You might be the one who vaults right over the heads of those who thought they could outdo you. So move beyond rhetoric and verbal challenges. You'll soon be in a moment to prove what puts you above the rest by demonstrating it in action.
0.31-0.4	The Five of Wands symbolizes struggles caused by ambition and competition. In the future, you may experience conflict, loss, or adversity on a passion project or creative endeavor. The Five of Wands in this position encourages you to find your natural ambition -- even when you're tired or discouraged. Identify what you would fight for, and what you are passionate about. Strive to make what energizes you as the centerpiece of how you spend your time.
0.41-0.5	The Eight of Wands is a card of work and change, when you cannot control what is happening to you, or how quickly it's happening. In this position, this card advises you to learn all you can from recent successful experiences. Take note of what did and didn't worked before. Feel confident in your freedom to strike out in new directions and not just cling to past successes and previous accomplishments.
0.51-0.6	The Two of Wands represents the second step on an adventure or creative journey, when it's time to plan a real course of action. In this position, this card advises you to respect your own decision making process. Instead of criticizing yourself for indecisiveness, appreciate the various implications of possible choices. Avoid pushing yourself to make a commitment. At some point you'll have enough information: the decision-making process will be over and the choice will be clear.
0.61-0.7	The Three of Wands symbolizes an inner balance that will allow you to feel optimism about new creative endeavors or adventures in the future. In this position, this card advises you to act quickly and powerfully on an idea or desire you have been feeling. This card suggests ideal timing, making it a good idea to stay in the moment and respond to your instincts. Every fiber of your being may be saying something is a great opportunity, even if those around you aren't as convinced. But there's nothing to lose from taking a risk, and it will be a great moment in your growth. Make your move and sort out the details later.
0.71-0.8	The Ace of Wands symbolizes a pivotal act or fateful step that will begin a new passion or adventure. In this position, this card encourages energetic movement toward activity. Brace yourself and get ready to spring into action. You may need to make your move soon in the future, so make sure you are fully prepared. Trust your instincts, and be spontaneous. When the opportunity comes, you'll want to seize it without hesitation. So quicken your senses: there's excitement in the air, and it supports your immediate ambitions.
0.81-0.9	The Four of Wands is a card of teamwork, with a focus on coming together to create something positive for the future. In this position, this card supports your good, productive, evolutionary ideas. Concentrate on connecting with others: use your charisma and power to attract like-minded people so you can increase your sphere of influence -- the more you can reach, the better. As you share more freely what's on your mind, others will see themselves in your vision, and you will naturally gain approval and assistance.
0.91-1.0	The Six of Wands represents respect and recognition for the efforts you've put in. In this position, this card advises taking action on your strongest convictions. Usually the first person to break away from conventional thought is the one to define a new trend. So continue to articulate and define yourself in light of the torch you are carrying. This will inspire others to conceive some new ideas of their own, and you may find yourself becoming a leader in the future. Under the circumstances, there will soon be a solid need for a fresh voice and vision -- so make your move. Those around you who are ready for change will support your leadership.

Appendix 3: Follow-Up Discussion Guide

- What did you think of your tarot card reading?
 - How would you describe the experience overall?
 - How did you feel about the questions asked?
 - How did you interpret the visualization on screen?
 - Did the cards you got resonate with you?
- As previously mentioned, this reading used natural language processing and other software to learn and make predictions about you. In general, how well do you think recommendation systems in technologies you use make predictions about you?
 - Does this differ for different types of recommendation systems? (e.g. for content like music, movies, articles, etc. or ads for products/services)
 - What are your general opinions of recommendation systems? Of targeted ads?
- Thanks so much for participating in our research. That's all we had planned. Do you have any questions for us?