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# NotifAcTalk: Designing a Notification System for Overcoming Procrastination Using a Voice-Based Conversational Agent

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# NotifAcTalk: Designing a Notification System for Overcoming Procrastination Using a Voice-Based Conversational Agent

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**Abstract**

Procrastination is a pervasive issue in modern society, increasingly recognized not merely as poor time management but as a failure of emotion regulation driven by the avoidance of negative affect. While human interventions (e.g., phone calls) are effective, they are socially costly, whereas conventional push notifications lack the forcefulness to break inertia. To bridge this gap, we propose NotifAcTalk, an intervention system integrating telephony interfaces with interactive Generative AI. In this system, the user receives an incoming call at a pre-set time, where a generative AI agent verbally encourages them to initiate their task. The system employs a dual-stage approach: utilizing the intrusive modality of a phone call to physically interrupt user activity, followed by psychological scaffolding via voice dialogue with an AI agent. Preliminary results indicate that the AI-driven condition elicited faster behavioral change and higher intrinsic motivation compared to non-interactive interventions. This work presents a new horizon for Human Augmentation, where technology complements human willpower through a fusion of forcefulness and empathy.

**概要**

現代社会において、先延ばし（Procrastination）は単なる時間管理の不備ではなく、不快な感情の回避に起因する感情調整の失敗として認識されつつある。これに対し、人間による介入（電話など）は効果的だが社会的コストが高く、一方で従来のプッシュ通知システムは行動の慣性を断ち切るための強制力に欠けるという課題があった。

そこで本研究では、電話インターフェースと対話型生成 AI を統合した介入システムである NotifAcTalk を提案する。ユーザは事前に設定した時間にシステムから電話着信を受け、通話内において生成 AI に行動を開始するよう励まされる。本システムは、電話着信という侵入的なモダリティを用いてユーザーの回避行動を物理的に中断させ、直後の AI エージェントとの音声対話を通じて行動開始への心理的な足場かけを行うという、2 段階のアプローチを採用する。予備実験の結果、AI 主導の条件は、非対話的な介入と比較してより迅速な行動変容と高い内発的動機付けを引き出すことが示唆された。本研究は、強制力と対話性の融合によりテクノロジーが人間の意志力を補完する、人間拡張の新たな可能性を提示する。

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# Chapter 1 Introduction

## 1.1 Background

The act of delaying necessary tasks is known as "Procrastination"[30, 35]. It is a serious issue that not only negatively impacts individuals' physical and mental health[18, 33, 32] but also leads to reduced productivity in individuals and organizations[10], as well as lower academic performance in adolescence[39]. Surveys indicate that 80–95% of college students experience procrastination[35]. Furthermore, it has been reported that students who chronically procrastinate tend to have lower academic grades compared to those who do not[39]. In the professional sphere, the U.S. Patent and Trademark Office reported that patent examiners procrastinating on report submissions until immediately before deadlines resulted in a delay in processing 11,000 applications annually, accounting for 17% of the backlog[10].

Especially in recent years, with the proliferation of short-form videos[43], the entrenchment of remote work following the COVID-19 pandemic[26], and the expansion of ICT use in education, countermeasures against such procrastination have become increasingly important. From a psychological perspective, procrastination is defined not merely as laziness or a lack of time management skills, but as a Failure of Emotion Regulation—an attempt to escape from negative emotions associated with tasks, such as anxiety or boredom[34, 32].

As a countermeasure to procrastination, smartphone notifications (alarms and calendar reminders) are most commonly used. However, since these are passive interventions(Fig. 1.1) relying on simple stimuli (momentary notification sounds or visual banners), they are easily ignored or snoozed by users[19, 38]. Consequently, existing notification systems lack the forcefulness required to encourage behavioral change in users, making it difficult to provide sufficient support.

Human-based interactive intervention is a powerful means to solve this problem. Public commitment—declaring goals or sharing progress with others—is widely recognized as effective for initiating actions and achieving goals[9, 44]. In particular, communication via telephone is known to foster stronger social connections compared to text-based methods, and its effectiveness has been demonstrated in medical and counseling fields[36, 40, 31, 23]. However, asking others to call for trivial daily tasks (such as exercise or housework) incurs high social costs and is not realistic. Furthermore, seeking support from doctors or specialists involves psychological stress, meaning these human-based interventions lack scalability[41].

In the Human-Computer Interaction (HCI) community, various strategies have been explored

to combat procrastination. Gamification (applying game elements such as points, competition, and rules to non-game contexts)[15, 22] is one of the most popular approaches in HCI research for enhancing user motivation[14, 6]. However, as many studies point out, there is a risk that the user's interest shifts from the task itself to "winning the game," leading to counterproductive behavior where the original objective is neglected[21, 37, 12, 7, 1]. Similarly, approaches utilizing external pressure (which use peer monitoring or financial penalties) have proven effective in enforcing immediate compliance[44, 9, 8, 42]. However, these methods have the drawback of inducing high levels of psychological stress and anxiety, lowering user motivation, and making long-term system acceptance difficult[28].

Regarding auditory interventions, it is known from neuroscience that human voices are processed preferentially over other sounds. Spoken communication conveys paralinguistic cues more easily than text and is effective in nurturing social connections[23]. Kim and Song proposed a notification method that increases task completion rates by using recorded human voices, even without actual human involvement[20]. However, these interventions using recorded voices remain static and one-way; they cannot respond to real-time user reactions. Therefore, they fail to provide the necessary support when users face specific psychological barriers or contextual challenges.

Furthermore, recent advancements in Large Language Models (LLMs) have made it possible to create chatbots that provide empathetic and context-aware support[2, 5]. However, many existing systems remain limited to reactive designs that wait for text or voice input from the user. Since it is rare for users in the midst of procrastination to voluntarily initiate interaction, this lack of proactivity is a fatal flaw for interventions designed to break procrastination.




Figure 1.1: Example of weak interventions which are easily ignored or snoozed.

## 1.2 Objective and Approach

Based on the background discussed in the previous section, the objective of this study is to realize a procrastination prevention method that integrates high forcefulness with interactive scaffolding.

First, high-intrusiveness interaction is necessary. Unlike passive text or monotonous alarm sounds, effectively breaking user inertia requires leveraging modalities that demand immediate attention and evoke social presence.

Second, adaptive scaffolding is required. Since procrastination stems from a failure of emotion regulation rather than mere forgetfulness[34, 32], the system must provide functions beyond static reminders. That is, real-time, context-aware persuasion is needed to lower the user's psychological hurdles. While existing intervention methods have treated these elements separately, they have not successfully integrated them into a single system that seamlessly fits into the user's daily life.

Additionally, research on approaches in the medical field[36, 40, 31, 23] (interventions via phone calls to encourage behavior through human dialogue) often focuses on economic contexts—such as preventing financial losses from missed appointments—suggesting that investing in labor costs is worthwhile. Consequently, these studies discuss the act of calling and the act of dialogue together, without separating their specific effects on preventing procrastination. Therefore, this study also aims to discuss the effects of both elements separately regarding procrastination prevention.

To implement the approach proposed in this study, we propose NotifAcTalk (**??**), a method that utilizes generative AI to perform voice interventions via simulated phone calls. In this system, the user receives an incoming call at a pre-set time, where a generative AI agent verbally encourages them to initiate their task (Fig. 1.3). To realize this approach, this system uses the standard iOS telephone function (CallKit)[16] to generate incoming calls. This design realizes a forceful intervention that is significantly more difficult to ignore compared to standard push notifications. While this may initially seem like an unpleasant experience for the user, in the field of HCI, utilizing specific discomfort to contribute to user attention and behavioral change is known as Beneficial Discomfort[4], and this system strategically leverages this effect.

When the user answers the call, a real-time voice dialogue with an AI agent driven by an LLM begins. Unlike static scripts, the AI agent dynamically adapts its persuasion strategy, showing empathy, breaking down tasks, and providing encouragement. Ultimately, by allowing the call to end only when the user feels "ready," the system prompts autonomous task initiation. In other words, the call experience itself functions as a catalyst for behavioral change.

The significance of this study extends beyond proposing a mere task efficiency tool. Accumulating successful experiences and enhancing self-efficacy is directly linked to the improvement of individual well-being. This is extremely significant in the modern era, where there is a demand to reduce mental burdens caused by digital technology. At the same time, this method raises the baseline of individual productivity itself, which could not be approached solely through workflow

efficiency. This can serve as an effective solution to maximize individual potential through Human Augmentation via technology, addressing the shrinking workforce in developed countries. Furthermore, this productivity improvement promotes individual economic independence and empowerment, contributing to the construction of an environment where everyone can work with dignity.




Figure 1.2: Overview of the usage scenarios for our proposed system.




1. Set Task 2. Receive Call 3. Interact with AI

Figure 1.3: The workflow of registering a task into the system.

## 1.3 Contributions

The contributions of this paper are as follows:

- We presented the design and implementation of a procrastination prevention method that integrates the forcefulness of phone calls with the scaffolding of AI dialogue.
- We verified the effectiveness of the proposed method and presented insights and improvements for future large-scale long-term experiments.

## 1.4 Structure of the Thesis

The structure of this paper is as follows. Chapter 1 presented the background, objective and approach, contributions, and structure of this study. Chapter 2 discusses related work, including the analysis of the causes of procrastination, the limitations of existing passive notification methods, the effectiveness of phone calls and issues with existing research, the validity and necessity of interactivity, and the potential of adaptive intervention by generative AI along with the limitations of current systems. Chapter 3 presents the design and implementation of the proposed method, NotifAcTalk. Chapter 4 describes the preliminary experiment conducted to verify the system's effectiveness, its results, the limitations of the current system, and future developments. Chapter 5 states the conclusion of this paper.

# Chapter 2 Related Work

This chapter outlines the mechanism of procrastination and discusses the limitations of existing technical interventions.

## 2.1 The Nature of Procrastination: From Time Management to Emotion Regulation

In traditional perspectives, procrastination has often been viewed as a personal character trait, such as "lack of time management skills" or "laziness." However, recent psychological research refutes this view. Previous research defined procrastination as a Failure of Emotion Regulation intended to avoid negative emotions associated with unpleasant tasks[30, 35] (e.g., anxiety, boredom, lack of self-efficacy). In other words, individuals who procrastinate prioritize short-term mood repair over larger future rewards, escaping from tasks that trigger unpleasant emotions to engage in temptations that offer immediate rewards, such as browsing social media or watching videos.

This shift in definition provides decisive implications for the design of intervention systems. Existing productivity tools like calendars and To-Do lists primarily focus on providing cognitive information—"what to do and when." However, since the root of the problem lies in emotion, simply reminding the user of the task's existence is insufficient. To suppress the user's strong impulsivity to avoid tasks and to initiate action, a more powerful emotional and psychological approach that goes beyond rational information transmission is essential.

## 2.2 Intervention Modality: Forcefulness and Confounding Factors

### 2.2.1 Vulnerability of Asynchronous Text Notifications

Currently mainstream push notifications (banners and pop-ups) are passive interventions relying on visual information. While these present information to the user, the timing of checking and the decision to respond are left to the user. Since users engaging in procrastination are already immersed in avoidance behaviors (such as SNS or games), such weak interventions are easily dismissed or snoozed. In short, existing notification systems decisively lack the Forcefulness required to break the user's strong inertia and forcibly direct their consciousness toward the task.

### 2.2.2 Forcefulness of Synchronous Voice and Confounding Factors

In contrast, interventions using a Telephony Interface possess an intrusive nature that occupies both vision and hearing simultaneously, interrupting the user's operations. As suggested by previous research, phone ringtones and call interfaces create a higher Psychological Pressure to Respond compared to text notifications[3, 29].

While it is widely reported that human telephone intervention is effective for behavioral change, existing research[36, 40, 31, 23] has significant limitations. Since prior studies have focused mainly on medical or counseling contexts, existing literature typically evaluates such interventions as a whole, confounding the effect of the act of receiving a call with the effect of the dialogue content (the subsequent conversation). Therefore, it remains unclear whether the breaking of procrastination is caused by the pure force of interruption breaking the user's inertia, or by the persuasive content provided during the interaction. This study aims to separate these two factors. Specifically, by comparing non-interactive call interventions using static recorded voice (one-way) and interactive intervention calls (NotifAcTalk)—both of which utilize phone call intervention—we identify the respective contributions of the forcefulness of the phone call and Conversational Persuasion in the context of procrastination.

## 2.3 Intervention Content: From Static Monologue to Proactive Dialogue

### 2.3.1 From Attention to Scaffolding

Interrupting the user's avoidance behavior and attracting attention through the "forcefulness" mentioned in the previous section is only the first step. Simply interrupting does not guarantee that the user will execute the task. Since the cause of procrastination lies in the failure of emotion regulation[34, 32], it is necessary to provide specific support, or Scaffolding, to help the user overcome psychological barriers immediately after the interruption. Many existing forceful intervention methods lack this perspective of accompaniment until execution.

### 2.3.2 Advantage of Voice and Static Limitations

As a means of this scaffolding, we focus on the power of the Human Voice. Kim et al. proposed a notification method that increases task completion rates by using recorded human voices, even without actual human involvement[20]. Voice conveys paralinguistic information (emotion, urgency) more easily than text and is an extremely effective modality for fostering social presence. However, conventional approaches (such as recorded voice) do not fully utilize the power of voice.

Because they are static and one-way, they cannot accept and persuade users when they show resistance or make excuses like “I’m tired now” or “I’ll do it later.” In other words, while using the excellent medium of voice, the lack of Interactivity—a potential unique to voice—becomes a bottleneck.

### 2.3.3 Adaptive Dialogue via Generative AI and Proactivity

Recent Large Language Models (LLMs) offer a breakthrough solution to this challenge. LLMs are capable of highly contextual understanding and empathetic dialogue; they can show Empathy for the user’s negative emotions, perform Task Decomposition to break tasks into smaller steps, and provide Encouragement[2, 5]. Many recent models also support voice input/output[25, 11]. As the CASA theory (Computers Are Social Actors) suggests, humans show social reactions to interactive agents[27, 24]; thus, these actions by AI have the potential to function as powerful scaffolding to lower users’ psychological hurdles.

However, existing AI chatbots have a fatal structural defect: they are designed to be Reactive, waiting for user access. It is often difficult to expect users in the midst of procrastination to voluntarily open an app.

Therefore, this study integrates the forcefulness of the telephone modality with the adaptive dialogue of AI, and further realizes Proactivity where the system initiates the intervention. Through this, NotifAcTalk provides a consistent behavioral change process: “Forcibly providing a trigger (Forcefulness)” and “Accompanying until action initiation through dialogue (Scaffolding).”

# Chapter 3 Implementation

In this study, to verify the effectiveness of Forcefulness and Interactive Scaffolding, we designed the intervention method NotifAcTalk and developed an iOS application to realize its philosophy. The system consists of three elements: (1) a backend that manages intervention schedules (Firebase), (2) an iOS client that executes interventions (CallKit), and (3) a conversational agent that generates voice dialogue (OpenAI Realtime API[25]). The processing flow is as follows: When the user sets a scheduled study time, a VoIP Push is sent from the server at the designated time. Upon receiving this, the client launches the telephone interface, and when the user answers, a real-time dialogue session with the AI agent begins via WebRTC (Fig. 3.1). This chapter details each element of the system.

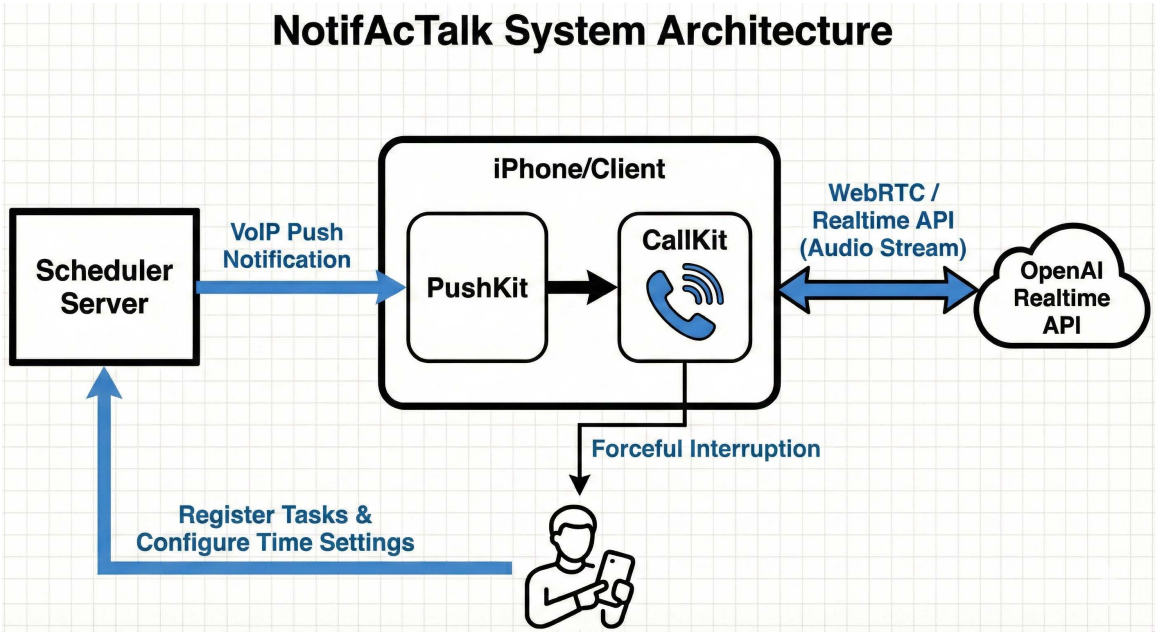



Figure 3.1: NotifAcTalk system overview.

## 3.1 Modality: Designing Forceful Intervention via CallKit

### 3.1.1 Proactive Intervention via CallKit

To proactively intervene in the user's living space from the system side, this implementation adopted CallKit, the standard telephone function of iOS. Furthermore, since iOS stops apps in the background or those that have been task-killed for power consumption and security reasons, CallKit alone might not be able to start the intervention at the designated time. Therefore, by utilizing VoIP Push (PushKit[17]) to trigger CallKit, the system can forcibly launch the app even if it is in the background or task-killed. This realizes a Proactive intervention where the system initiates the incoming call even if the user has not opened the app.

### 3.1.2 Forced Decision Point & Beneficial Discomfort

The incoming call screen via CallKit occupies the entire display and is accompanied by auditory dominance via the ringtone. This prevents the user from "turning a blind eye" as with banner notifications and forces a binary choice on the spot: "Answer or Decline." This Forced Decision Point functions as the key to breaking the inertia (status quo bias) of procrastination. While forceful intervention by phone call may negatively affect the UX experience, in the field of HCI, methods that induce temporary tension or discomfort in users to encourage deep thinking or behavioral change are known as Beneficial Discomfort[4]. The forced call in this system involves temporary discomfort to physically block user avoidance behaviors (such as SNS), but it functions as a trigger to prevent Automatic Dismissal and switch consciousness toward long-term goal achievement (Benefit).

### 3.1.3 Hands-free & Multitasking Support

Additionally, the adoption of CallKit enables task execution while receiving intervention. In the case of text notifications, the user must direct visual attention to the screen and manipulate it with their hands. However, with a telephone interface (especially when using a speaker or earphones), the user can keep both hands free to prepare for studying, such as opening a browser, while continuing to receive encouragement through the call. Furthermore, since CallKit can maintain the call state in the background, the intervention and task execution do not physically compete, minimizing the physical friction (Interaction Cost) until action initiation.

## 3.2 Content: Designing Scaffolding via Real-Time AI

### 3.2.1 Technical Infrastructure for Low-Latency Dialogue

For effective scaffolding, natural conversational tempo (Turn-taking) equivalent to humans is essential. Conventional voice dialogue systems (STT $\rightarrow$ LLM $\rightarrow$ TTS pipeline) relied on HTTP

request-type processing, where delays of several seconds impaired conversational fluidity. To solve this issue, this implementation adopted the OpenAI Realtime API[25] and used WebRTC for the communication protocol. This enabled direct input/output of audio streams to the model without intermediate text conversion, minimizing latency and establishing the technical infrastructure to realize the natural interaction described below.

### 3.2.2 Dialogue Strategy and System Behavior

In this interactive framework, the AI is designed to function not merely as a response system but as an empathetic partner leading the user to action. The system analyzes the context of the user's speech and their emotional state to dynamically select the optimal persuasion strategy. Specifically, when a user expresses negative emotions such as "It's a hassle" or "I don't want to do it," the system does not negate them but performs appropriate Psychological Care, such as saying, "I understand that feeling well." Additionally, if the user cannot start the action, the system facilitates consensus building for task initiation by performing Task Decomposition, proposing manageable micro-tasks like "Let's just open the browser for now." This allows approaching vague goals (e.g., complete studying) with small steps like "First, stand up from the chair" or "Take just one step." Furthermore, the system provides immediate positive feedback, such as "Wonderful!," when the user makes progress, reinforcing motivation.

Moreover, these dialogues are extremely fluid. The system possesses a Barge-in capability; even in the middle of a sentence, if the user interrupts with "Wait a minute," the system immediately stops output and shifts to a listening stance. This function eliminates mechanical one-way communication and enables natural conversation close to that of a real human.

### 3.2.3 Autonomy

Since the subject of the final action is the user, the authority to end the call is left to the user. The system is designed to encourage decision-making for task initiation by having the user hang up the phone themselves at the end of the dialogue. This physical disconnection action functions as an Autonomous Commitment, preventing dependence on the system.

## 3.3 Usage Scenario

We illustrate the user experience of NotifAcTalk with a scenario involving a university student, Taro, who struggles to establish a running habit.

**Scene:** One morning, despite having scheduled a run, Taro is lazing around in bed, lacking the motivation to move. Suddenly, his phone rings loudly via NotifAcTalk. The screen is taken over by the incoming call interface. Surprised and compelled by the ringtone, Taro answers the phone.

**AI (Coach):** “Hey! Aren’t you supposed to be running right now?! Where are you and what are you doing?!”
**Taro:** “I’m still sleeping in bed...”
**AI (Coach):** “I see! Then first, just sit up! Right now!”
**Taro:** “O-okay, I did it...”
**AI (Coach):** “Well done! Next, just get one leg out of the *kotatsu* (heated table)!”

**Outcome:** Encouraged by the passionate coaching voice, Taro finally gets up and starts running. Once he begins, he finds it surprisingly enjoyable and gains confidence from the sense of achievement. Eventually, this develops into a daily routine, allowing him to maintain a healthy habit autonomously.

# Chapter 4 Results & Discussion

Prior to a large-scale long-term experiment to verify the effectiveness of the proposed method NotifAcTalk (Phone Intervention + AI Dialogue), a preliminary experiment was conducted to evaluate the initial system and obtain insights and points for improvement. This chapter presents a detail of the preliminary experiment, followed by the results and discussion.

## 4.1 Study Design

This study aims to assess the effectiveness of the proposed system through a comparative experiment involving a cognitive task prone to procrastination. We designed three intervention conditions to separately evaluate the impact of forcefulness and scaffolding, seeking to clarify which design factors are essential for breaking user inertia and supporting task initiation.

### 4.1.1 Participants

A total of six undergraduate and graduate students, including the author, participated in the experiment. Note that one participant was confirmed to have deviated from the experimental protocol (absence from sessions and improper settings), so they were excluded from the analysis, resulting in a final valid data count of five (N=5). Qualitative feedback via semi-structured interviews was received from the excluded participant as well.

### 4.1.2 Conditions

The experiment was conducted using a Within-subjects design comparing three intervention conditions. To minimize the influence of order effects, the presentation order of conditions was counterbalanced among participants. The definitions of each condition are as follows:

1. **Text Condition (Baseline):**

   A condition mimicking existing task management apps. Only a standard push notification (text) is sent at the designated time. This corresponds to “Low Intrusiveness / Non-Interactivity” in the classification.

2. **Voice Condition:**

   A condition of phone intervention using NotifAcTalk, but the content is a fixed recorded voice. This corresponds to “High Intrusiveness / Non-Interactivity.”

3. **AI Condition:**

   A condition using NotifAcTalk to perform real-time dialogue with generative AI. This corresponds to “High Intrusiveness / High Interactivity” and is the approach proposed in this study. For the persona of the coach in the AI conditions, a High-Energy Coach was adopted. This setting aimed to raise the Arousal of users engaging in avoidance behavior and generate Momentum for action.

### 4.1.3 Task

For the experimental task, GRE (Graduate Record Examinations) level English vocabulary learning was adopted as a task that is difficult for general college students and prone to avoidance behavior (procrastination). Participants were required to log in to the system using a browser after the intervention started, memorize five high-level words, and then take a quiz.

### 4.1.4 Procedure

The experiment was conducted over three days. On each day, participants set a learning start time according to their lifestyle, and at that time, an intervention trigger for each condition was sent from the server. After receiving the intervention and completing the task, participants answered a brief questionnaire using the Experience Sampling Method (ESM)[13] to report their immediate emotional state (motivation, discomfort, humanness, etc.). Furthermore, after all scheduled days were completed, semi-structured interviews were conducted to inquire in detail about subjective experiences and psychological changes regarding each condition.

### 4.1.5 Measurements

As a quantitative evaluation metric, the Total Conversion Time—the total time from the transmission of the intervention trigger to the start of the task (logging into the learning system)—was measured from logs. In addition, psychological metrics from ESM (Table 4.1) and qualitative data from interviewsTable 4.2 were integrated for a multifaceted analysis.

Table 4.1: List of EMS questionnaire items used in the experiment. All items were rated on a 7-point Likert scale (1 = Not at all, 7 = Very much).

| **Category** | **Variable ID** | **Question Item (Japanese)** |
|---|---|---|
| **Emotion** *(Negative)* | Upset | 今、動揺したり、イライラしたりしていますか？ |
| | Nervous | 今、心配だったり、不安を感じたりしていますか？ |
| **Emotion** *(Positive)* | Active | 今、活気がある、またはやる気を感じていますか？ |
| | Determined | 今、このタスクに対して「やってやるぞ」という意志を感じていますか？ |
| **Intrusiveness** | Interrupt | さきほどの通知は、あなたの活動を中断させるものでしたか？ |
| | Force | その通知は、無視できない強い強制力を感じるものでしたか？ |
| **Social & Scaffolding** | Social Presence | その通知の向こうに、人間のような存在感を感じましたか？ |
| | Scaffolding Hurdle | その通知のおかげで、学習を始める心理的なハードル（面倒くささ）が下がりましたか？ |

Table 4.2: List of semi-structured interview questions. The interview was conducted in Japanese to capture detailed nuances of the user experience.

| Category | Focus | Key Questions (Japanese) |
|---|---|---|
| **System** | Reliability | 3 日間の中で、通知が来なかったり、アプリが落ちたりした回はありましたか？ |
| | Compliance | 正直なところ、通知・着信に気づいていたけれど「無視した」、あるいは応答したけれど「学習しなかった」回はありますか？それはどの条件の時ですか？ |
| **Context** | Social Pressure | 着信があった時、外出中や友人と一緒にいたことはありましたか？その際、「恥ずかしい」「早く止めたい」という気持ちが応答行動に影響しましたか？ |
| | Hands-free | 電話を受けている最中、あなたの「手」と「目」は何をしていましたか？通話を続けながら、PC を開いたり机に向かったりしましたか？ |
| **Modality** | Pressure | テキスト通知だけの時と、電話画面（CallKit）が全画面で出た時で、「出なきゃ」というプレッシャーにどのような違いを感じましたか？ |
| | Discomfort | 電話がかかってきた瞬間、不快感や驚きを感じましたか？その感情は、タスクを始める上で「邪魔」になりましたか？それとも「背中を押す要因」になりましたか？ |
| **Interaction** | Motivation | 録音音声（Voice）と AI（対話）で、「やる気」や「責任感」に違いは感じましたか？AI に対して「返事をする」という行為自体が、行動のスイッチになりましたか？ |
| | Anthropomorphism | AI と話していて「人間（コーチ）と話している」ような錯覚を覚えましたか？具体的にどの瞬間、どの言葉、あるいはどの「間」がそう感じさせましたか？ |
| **Design** | Persona | 今回の AI の人格（熱血コーチ風）はどうでしたか？もしもっと淡々とした人格だったら、あなたは行動できたと思いますか？ |
| | Improvement | システムの改善点や、今後欲しい機能などはありますか？ |

## 4.2 Results

This section describes the Behavioral Metrics obtained from log data and the Psychological Metrics results obtained from ESM and interviews (Table 4.3).

Table 4.3: Summary of Behavioral (Conversion Time) and Psychological (ESM) Results across Conditions. Values represent Mean and Median time and Mean for ESM scores (7-point scale).

| | | **Behavioral** | **Psychological (ESM Scores)** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **ID** | **Condition** | **Conv. Time (s)** | **Active** | **Determined** | **Nervous** | **Upset** | **Interrupt** | **Force** | **Social** | **Hurdle** |
| | | *Mean / Median* | *Pos.* | *Pos.* | *Neg.* | *Neg.* | *Intr.* | *Intr.* | | *Scaff.* |
| 1 | **AI** | 118.3 / 94.3 | 4.4 | 5.0 | 2.0 | 2.4 | 6.2 | 5.0 | 4.6 | 4.6 |
| 2 | **Voice** | 5769.7 / 5063.9 | 2.2 | 2.2 | 1.8 | 2.2 | 4.8 | 4.4 | 2.8 | 3.0 |
| 3 | **Text** | 5233.5 / 5405.4 | 2.2 | 2.2 | 2.6 | 3.4 | 3.6 | 1.8 | 2.0 | 1.8 |

### 4.2.1 Behavioral Results: Reaction Time

Analysis was conducted for each condition regarding the Total Conversion Time, which is the total time from the intervention trigger to the start of the learning task.

- **AI Condition:** In the AI condition, a trend was observed where many participants started learning in a relatively short time after the intervention. The average time was 118.3 seconds, and the median was 94.3 seconds, indicating that behavioral change was achieved with high Consistency regardless of the situation the participants were in.
- **Voice Condition:** The average time for the Voice condition was 5769.7 seconds, with a median of 5063.9 seconds, showing a significant delay compared to the AI condition. However, in interpreting this result, the small sample size (N=5) of this experiment must be considered. Post-experiment investigation revealed that much of this delay was due to chance Situational Factors specific to certain participants, such as "not noticing the call because of being asleep," which significantly skewed the average. Given that many participants acknowledged the forcefulness of the phone call in the qualitative survey described later, there is a possibility that faster reactions than the Text condition could be observed in the Voice condition if situational noise is leveled out through larger-scale and longer-term experiments.
- **Text Condition:** Similarly, a large delay was seen in the Text condition (Baseline), with an average time of 5233.5 seconds and a median of 5405.4 seconds. Here, many instances of procrastination attributed to the weakness of the modality were reported, such as "overlooked the notification" or "thought I could do it later."

**Summary** From the above results, we avoid concluding statistical superiority between conditions based solely on behavioral data. However, it is noteworthy that while delays caused by situational factors occurred in the Voice and Text conditions, a trend of encouraging prompt initiation regardless of such situational factors was confirmed at least in the AI condition.

### 4.2.2 Psychological Results: ESM & Qualitative Findings

To elucidate the psychological mechanisms behind the behavioral data, ESM scores (7-point scale) and interview results were analyzed integrally. The ESM items were categorized into four dimensions corresponding to the table headers: *Positive Attitude* (Pos.), *Intrusiveness* (Intr.), *Scaffolding* (Scaff.), and *Negative Emotion* (Neg.).

**1. Motivation & Determination** Regarding the impact of intervention on user motivation, the AI condition recorded higher scores compared to other conditions. In terms of "Active" state, the AI condition (Active=4.4) scored double that of both Voice and Text conditions (Active=2.2). Similarly, regarding "Determined" (determination to do it), the AI condition (Determined=5.0) exceeded the other conditions (Determined=2.2). These quantitative results align with qualitative testimonies. "*I was encouraged to act more strongly by the AI than the recording*" (P3) and "*Since the AI encouraged me, I felt motivated*" (P5) were reported. It was shown that interactive encouragement functioned as a motivational factor beyond mere notification.

**2. Forcefulness & Intrusiveness** Regarding the physical strength of the intervention, the AI/Voice conditions using the telephone showed significantly higher forcefulness than the Text condition. In "Intrusive Force" (forcefulness that cannot be ignored), the AI condition (Force=5.00) and Voice condition (Force=4.40) far outstripped the Text condition (Force=1.80). In interviews, comments such as "*I thought text could wait, but I was forced to answer the phone*" (P3) and "*Text is displayed only for a moment, but the phone occupies the screen, so I felt it was important*" (P2) were heard, backing up that the strength of the modality via CallKit prevented "unconscious dismissal." Note that the AI condition showed a slightly higher score than the Voice condition; this infers that in addition to physical forcefulness, the Interactive Elements themselves might have been perceived as a stronger intervention by the user.

**3. Scaffolding Effect** Regarding the survey on "whether psychological hurdles (hassle) were lowered" (Scaffolding Hurdle), the results showed a clear hierarchical structure: AI (Hurdle=4.60) $>$ Voice (Hurdle=3.00) $>$ Text (Hurdle=1.80). The fact that the Voice condition showed a higher score than the Text condition indicates that phone intervention alone has a certain motivational effect (scaffolding). However, the fact that the AI condition received an even higher evaluation indicates that the effect is maximized by adding interactive support to the physical intervention. Regarding this factor, "*The AI divided the task into stages (Task Decomposition), so I got motivated*" (P6) and "*Declaring 'I will do it myself' to the AI acted like self-suggestion, leading to action*" (P4) were observed.

**4. Negative Emotion (Discomfort)** Despite using forceful intervention, no significant difference was seen in discomfort (Upset/Nervous) among the AI condition (Nervous=2.0, Upset=2.4), Voice condition (Nervous=1.8, Upset=2.2), and Text condition (Nervous=2.6, Upset=3.4); in fact, it tended to be lower in the AI condition. As stated in "*Thanks to the passionate personality, I got motivated*" (P5) and "*The praise ignited my motivation*" (P6), it was confirmed that the surprise and bewilderment caused by the intervention did not become factors hindering action but were converted into positive energy.

## 4.3 Discussion

### 4.3.1 The Synergistic Effect of Dialogue and Force

The high scores in the AI condition in ESM (Positive Active/Determined) indicate that interactive elements contributed to the users' psychological transformation. In the qualitative survey, "*I was encouraged by the AI and felt motivated*" (P5) and "*Declaring 'I will do it myself' to the AI became a self-suggestion*" (P4) were stated. It is inferred that the AI functioned as Psychological Scaffolding beyond mere notification. This result suggests the possibility that a two-stage process—where powerful Forcefulness creates a Trigger for action, and the subsequent dialogue process forms Motivation for action—effectively worked to prevent user procrastination.

### 4.3.2 Acceptance of High-Energy Intervention

While forceful intervention (High Intrusiveness) like this system generally risks damaging user experience, discomfort scores (Upset/Nervous) were kept low in this experiment. In interviews, opinions such as "*I prefer to be managed, so I liked this forcefulness as leadership*" (P6) were observed, indicating that strong intervention via phone calls did not have a negative psychological impact on users.

### 4.3.3 Limitations and Future Work

This study was a small-scale preliminary experiment with N=5 for 3 days, and effects such as noise from troubles like P3's device change or "Habituation" in long-term use have not been verified. Furthermore, values such as qualitative surveys, EMS, and Total Conversion Time may have large individual differences, so re-verification with increased participants is necessary. Therefore, future work requires verifying the sustainability of intervention effects through larger-scale and longer-term experiments.

Also, the qualitative survey provided important implications for future system expansion. First is the expansion of the intervention process. Requests such as "*I want to keep connected like a work*

*call*" (P3) and "*I want support for the learning itself*" (P4) indicate the need to develop from ending the intervention at the signal to start (Trigger) to Task-Concurrent Dialogue that accompanies the user during task execution. Second is adaptation to context. Requests for "*snooze functions*" and "*call history*" (P2–P4) show that flexibility is required to correspond to diverse living contexts such as sleeping or bathing. Finally, optimization of persona. The fact that preferences were divided between "*positive encouragement*" and "*matter-of-fact instructions*" (P5, P6) implies that no universal coach figure exists. Evolution into an Adaptive System where AI learns the user's state and personality and dynamically generates the optimal dialogue style for that moment is expected.

# Chapter 5 Conclusion

In this study, addressing "Procrastination," a major issue in modern society, we proposed and demonstrated NotifAcTalk, a system integrating physical Forcefulness and Interactive Scaffolding, going beyond conventional passive notification systems.

The three-day preliminary experiment and qualitative evaluation suggested the possibility that the high intrusiveness of the phone attracts user attention, while the subsequent interactivity with AI enhances user motivation and lowers psychological hurdles, thereby encouraging task initiation. Since this experiment was conducted over a limited period of three days, larger-scale and longer-term verification is necessary for generalization in the future. However, insights regarding the "balance between forcefulness and empathy" and "acceptance of personas" obtained through the preliminary experiment serve as important guidelines for future large-scale experiments and social implementation.

This study presented a new intervention design that does not end with the system merely being a powerful alert function but leads users to behavioral change through dialogue with AI. In the future, we will further develop this model through adaptive persona generation tailored to user context and the implementation of parallel interactions accompanying task execution.

The approach presented by NotifAcTalk holds significance beyond mere efficiency in task management. Overcoming procrastination is about individuals regaining the power to achieve goals appropriately, which is directly linked to the recovery of self-efficacy and the improvement of Well-being. This has extremely important significance in modern society (Digital Well-being), where reducing mental burden caused by digital technology and maintaining and promoting mental health are prioritized.

At the same time, this method proposes a new form of efficiency that raises the baseline of individual productivity itself, which could not be approached solely by improving workflow. This can be an effective solution to maximize individual potential through Human Augmentation via technology against the shrinking workforce in developed countries. Furthermore, this productivity improvement is significant not only in creating economic value but also in promoting empowerment such as individual economic independence and wage increases, and in building an environment where everyone can work with dignity, holding important meaning from a human rights perspective.

NotifAcTalk is not merely a notification tool but holds the potential to function as a partner that pushes and complements individuals' motivation and thoughts, possessing significant social meaning that contributes to future human society.

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# List of Publications

## International Conferences (Refereed)

- Taichi Inohara, Atsushi Handa, Ikkaku Kawaguchi. “NOTIFACTALK: DESIGNING A NOTIFICATION SYSTEM FOR OVERCOMING PROCRASTINATION USING A VOICE-BASED CONVERSATIONAL AGENT,” *Global Student Leadership Summit 2026 (GSLS 2026)*, Tsukuba, Ibaraki, Japan, January 9–11, 2026, 15 pages. (to be published in the *Malaysian Journal of Student Advancement*)

## Domestic Conferences (Non-refereed)

- 猪原 大智，半田 篤史，川口 一画.「NotifAcTalk: 生成 AI との音声対話を通じた先送り行動低減のためのリマインド手法の提案」，第 33 回インタラクティブシステムとソフトウェアに関するワークショップ (WISS 2025) 論文集，北海道，2025 年 12 月 3 日–5 日，4 pages.

# AppendixA Screenshots of the NotifAcTalk Application




Figure A.1: Application Home Screen




Figure A.2: Settings Screen

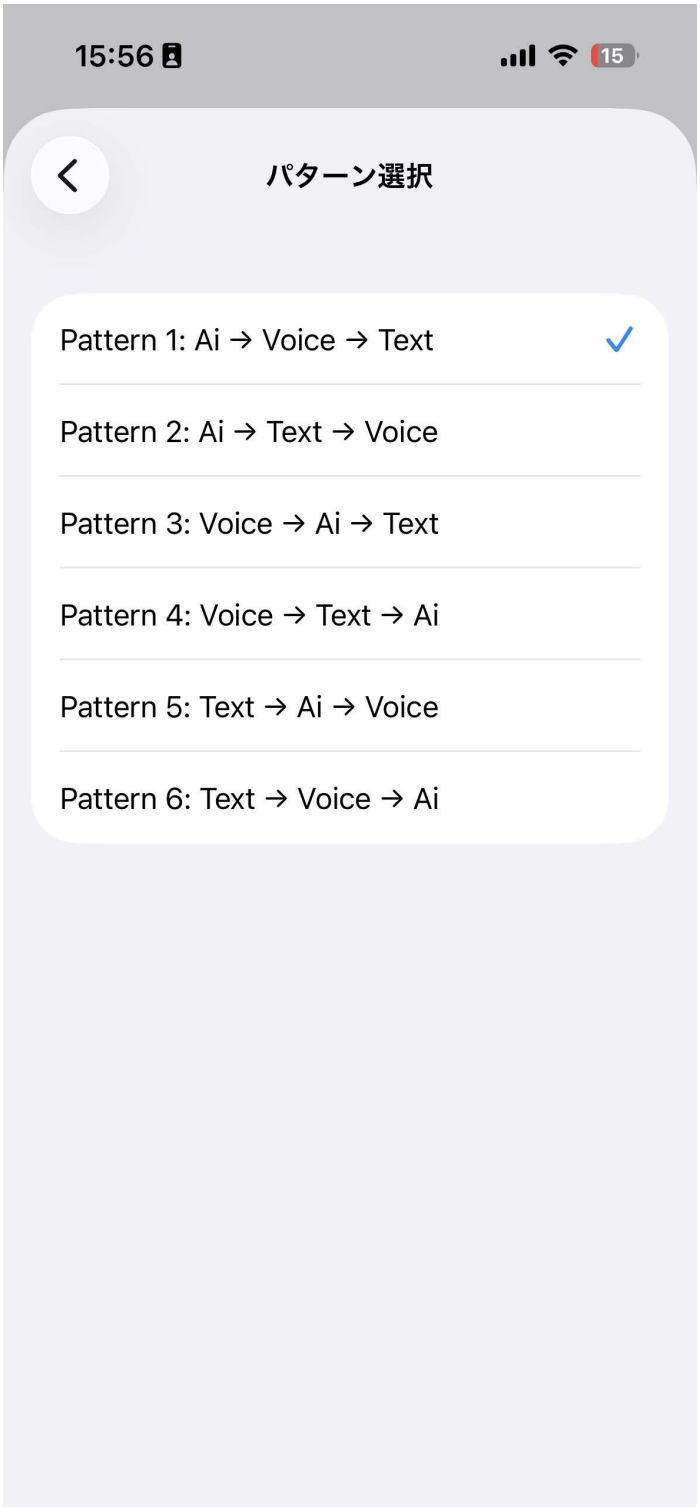



Figure A.3: Settings Screen (Experiment Order Configuration)




Figure A.4: Settings Screen (User ID Input)




Figure A.5: Settings Screen (Processing User ID)




Figure A.6: Settings Screen (Registration Complete)

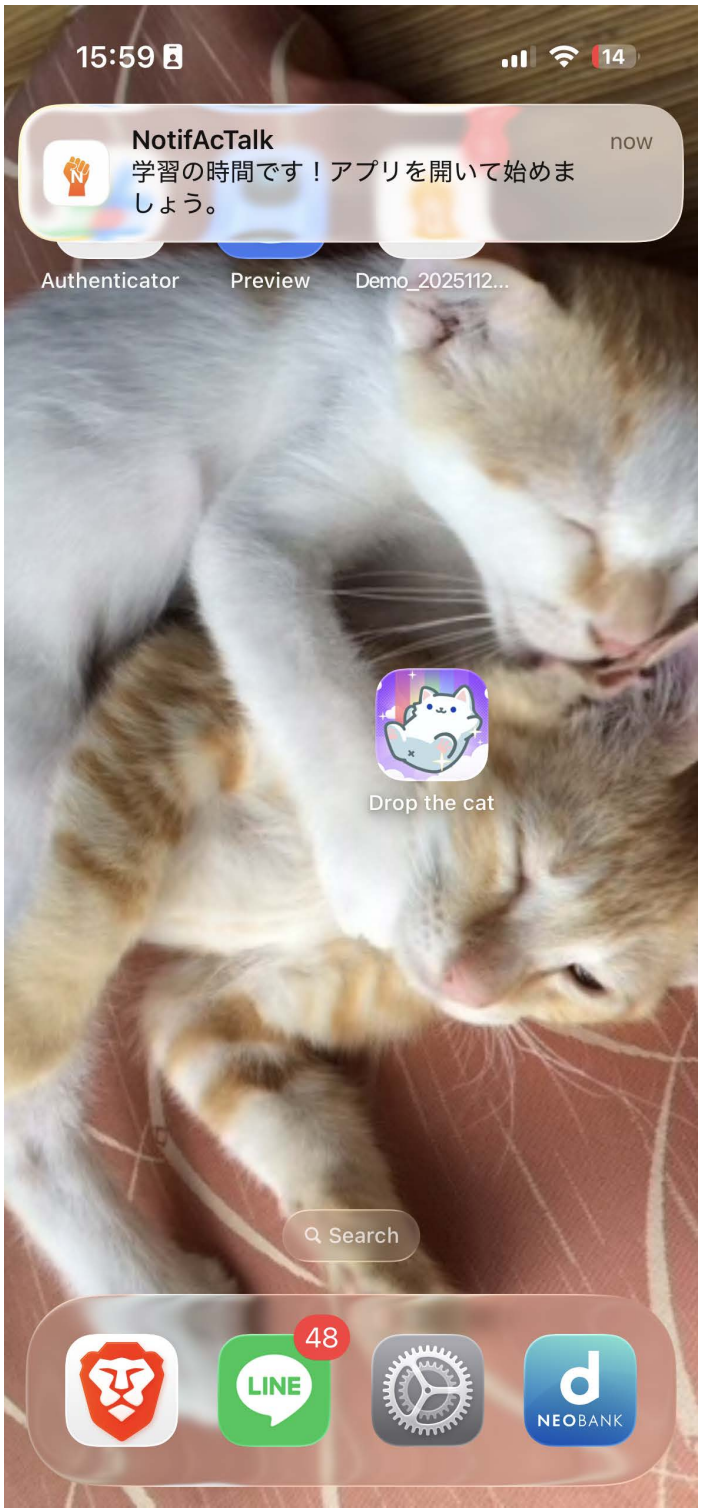



Figure A.7: Notification Banner (Unlocked State)




Figure A.8: Notification on Lock Screen

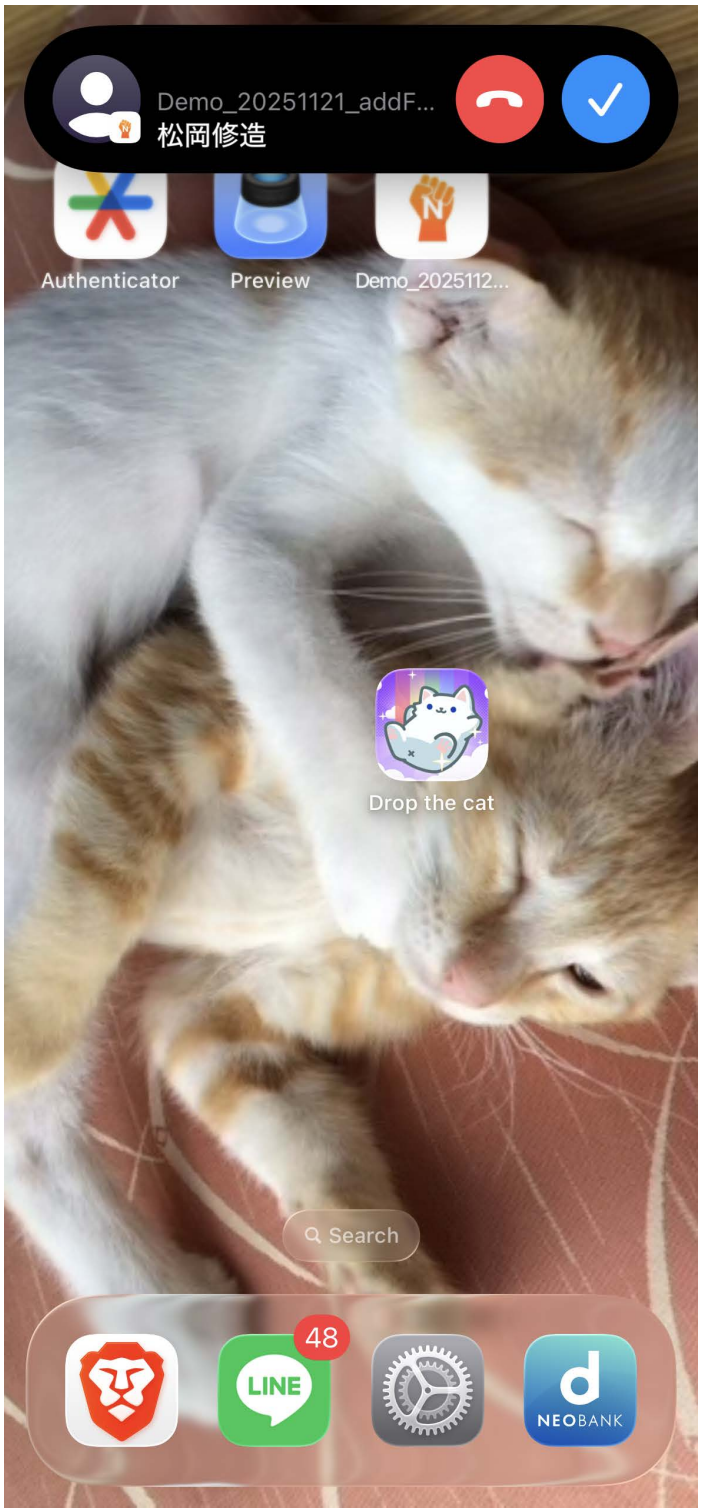



Figure A.9: Incoming Call Interface (Unlocked State)

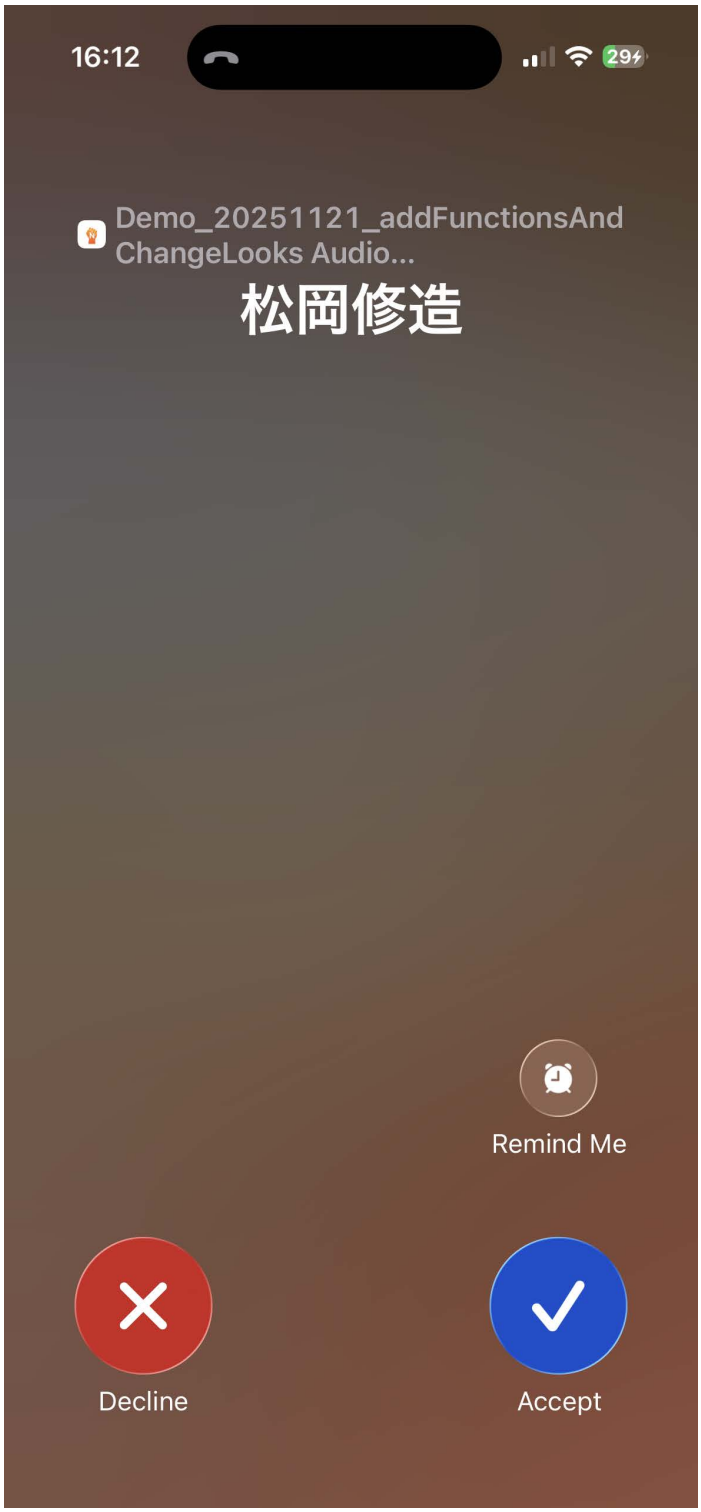



Figure A.10: Incoming Call Interface (Unlocked State 2)

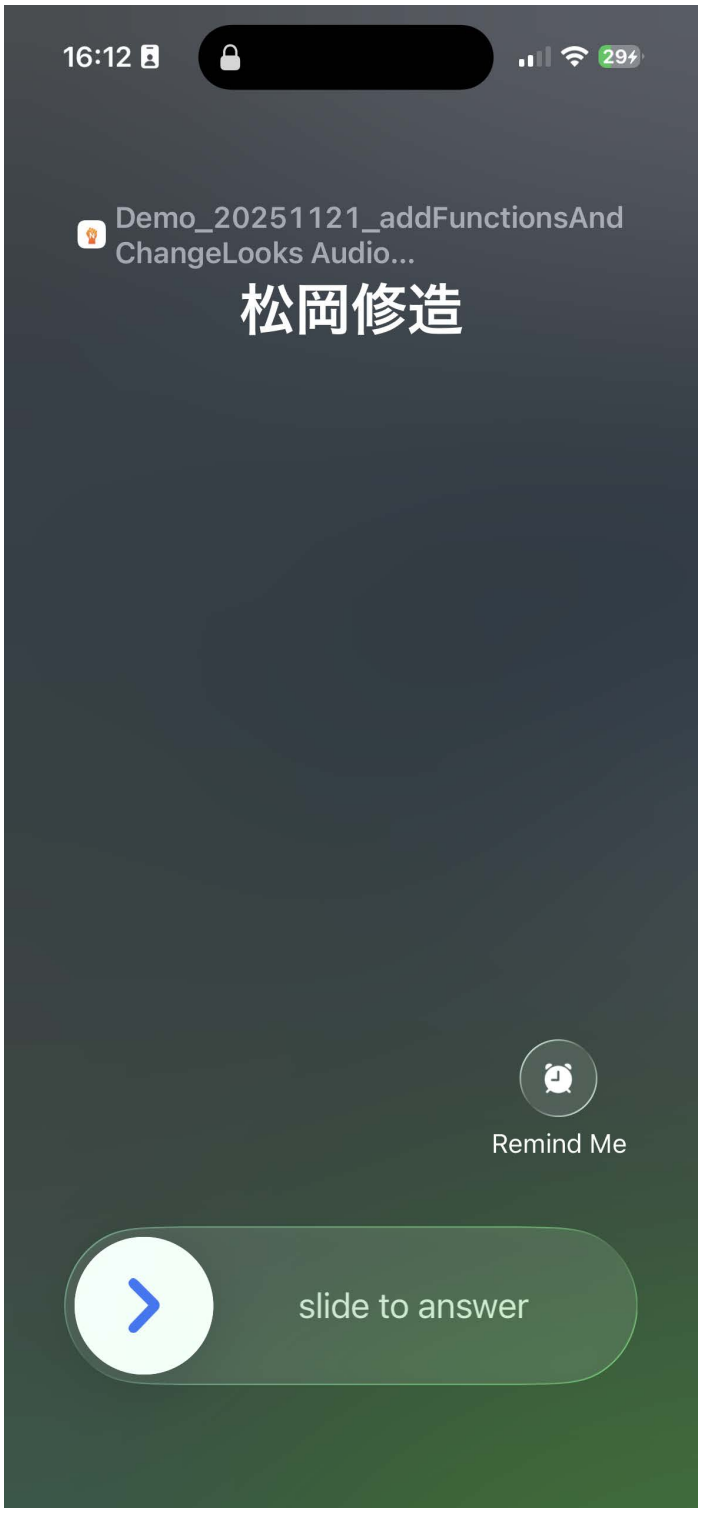



Figure A.11: Incoming Call Interface (Locked State)




Figure A.12: In-Call Interface (Unlocked State)

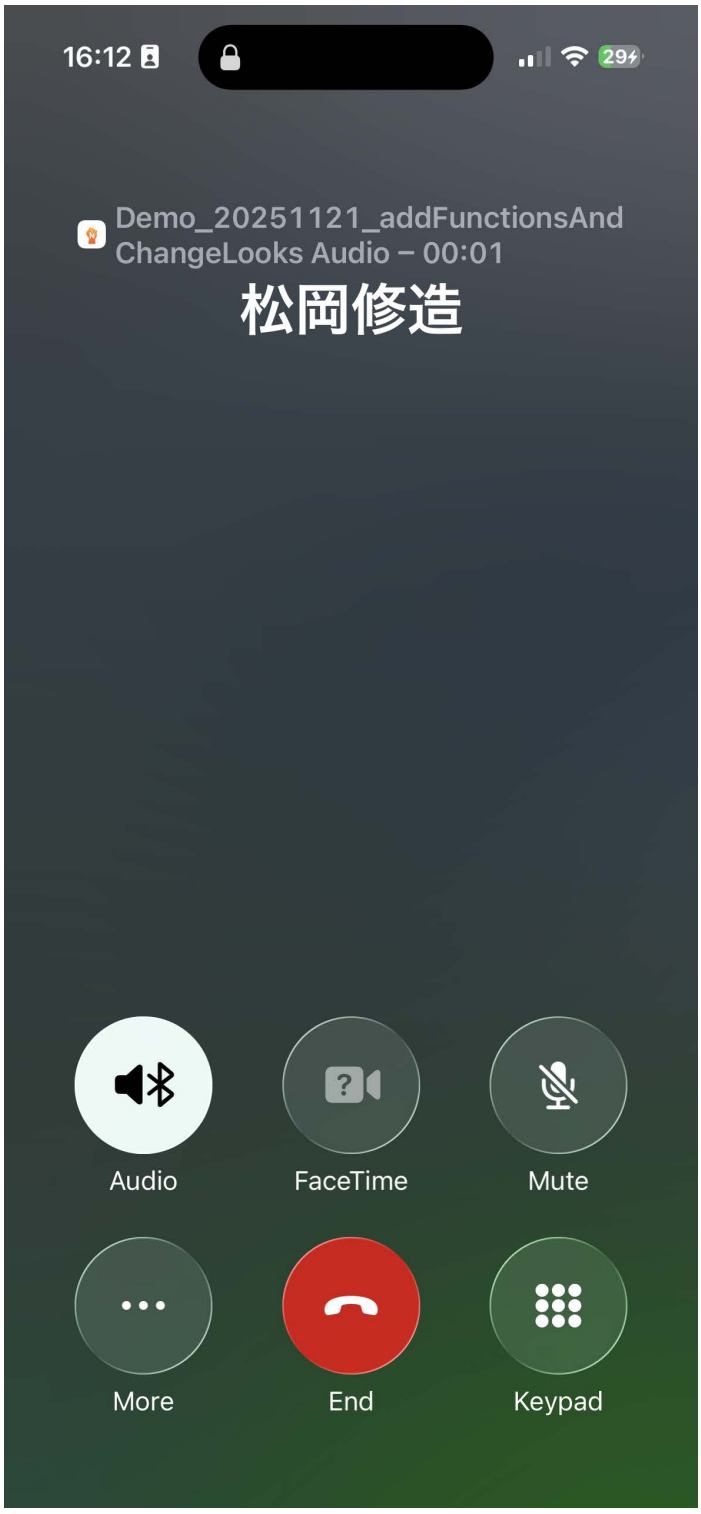



Figure A.13: In-Call Interface (Locked State)

# AppendixB Screenshots of the Web Vocabulary Learning System




Figure B.1: Login Screen (Home)

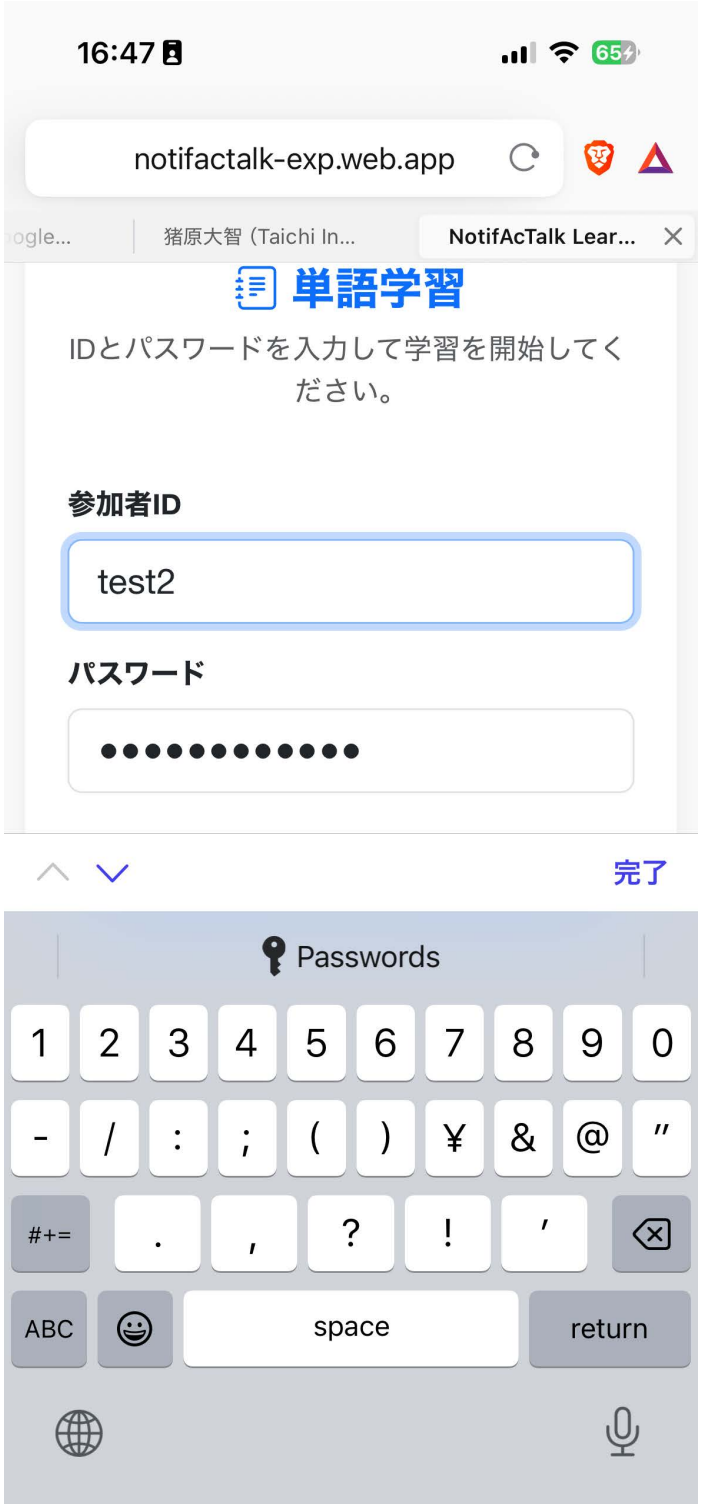



Figure B.2: Login Screen (Input ID & Password)




Figure B.3: Login Screen (Logging in)




Figure B.4: Learning Day Selection Screen




Figure B.5: Vocabulary Learning Phase 1 (Word Card)




Figure B.6: Vocabulary Learning Phase 2 (Japanese Translation Revealed)




Figure B.7: Vocabulary Learning Phase 3 (Confirmation to Proceed to Quiz)




Figure B.8: Learning Result Screen

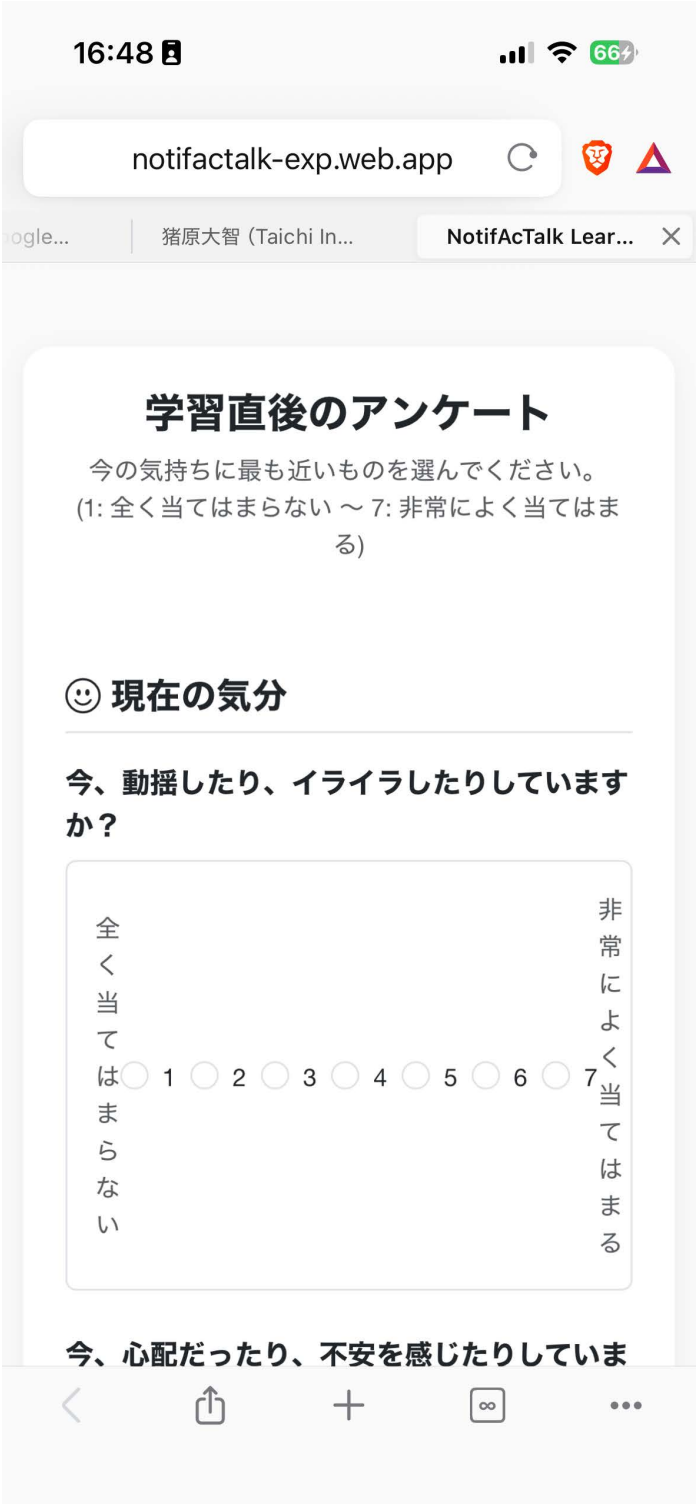



Figure B.9: ESM Questionnaire

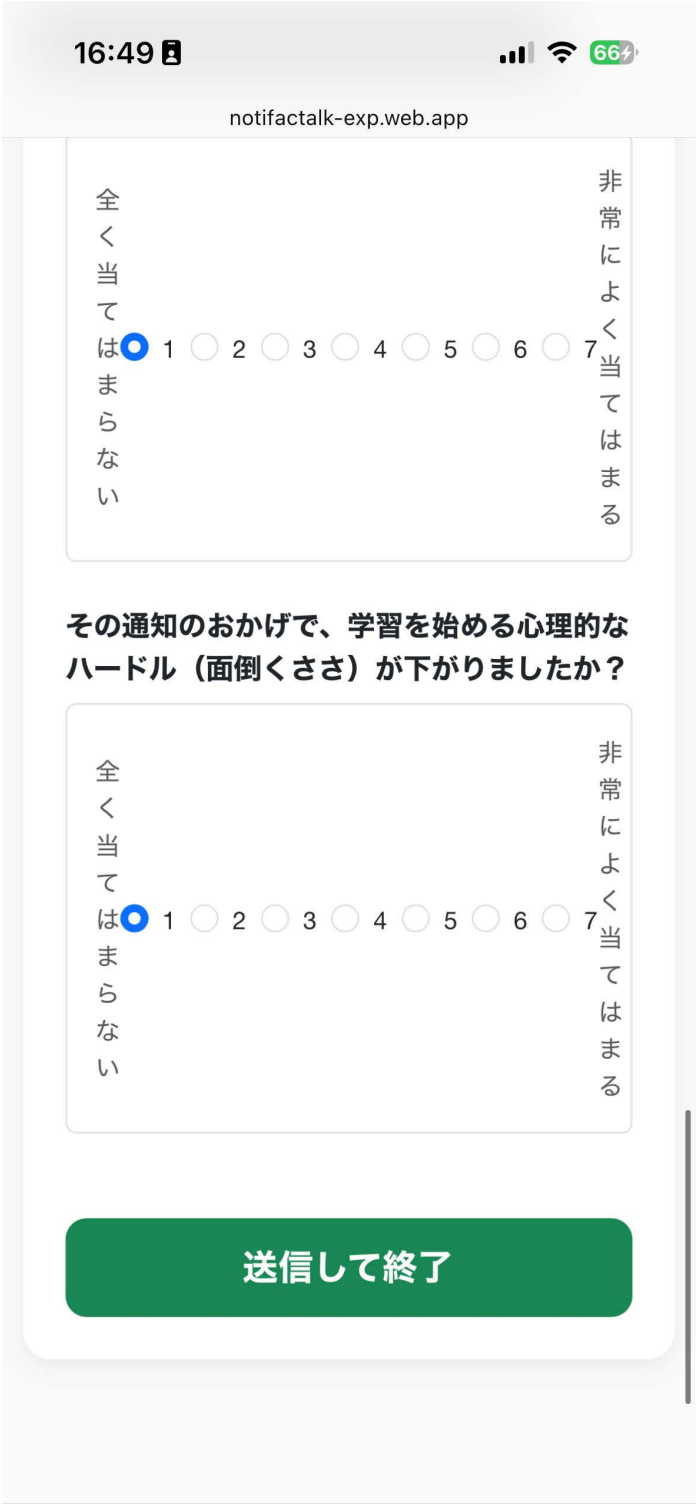



Figure B.10: ESM Questionnaire (Submit Button)

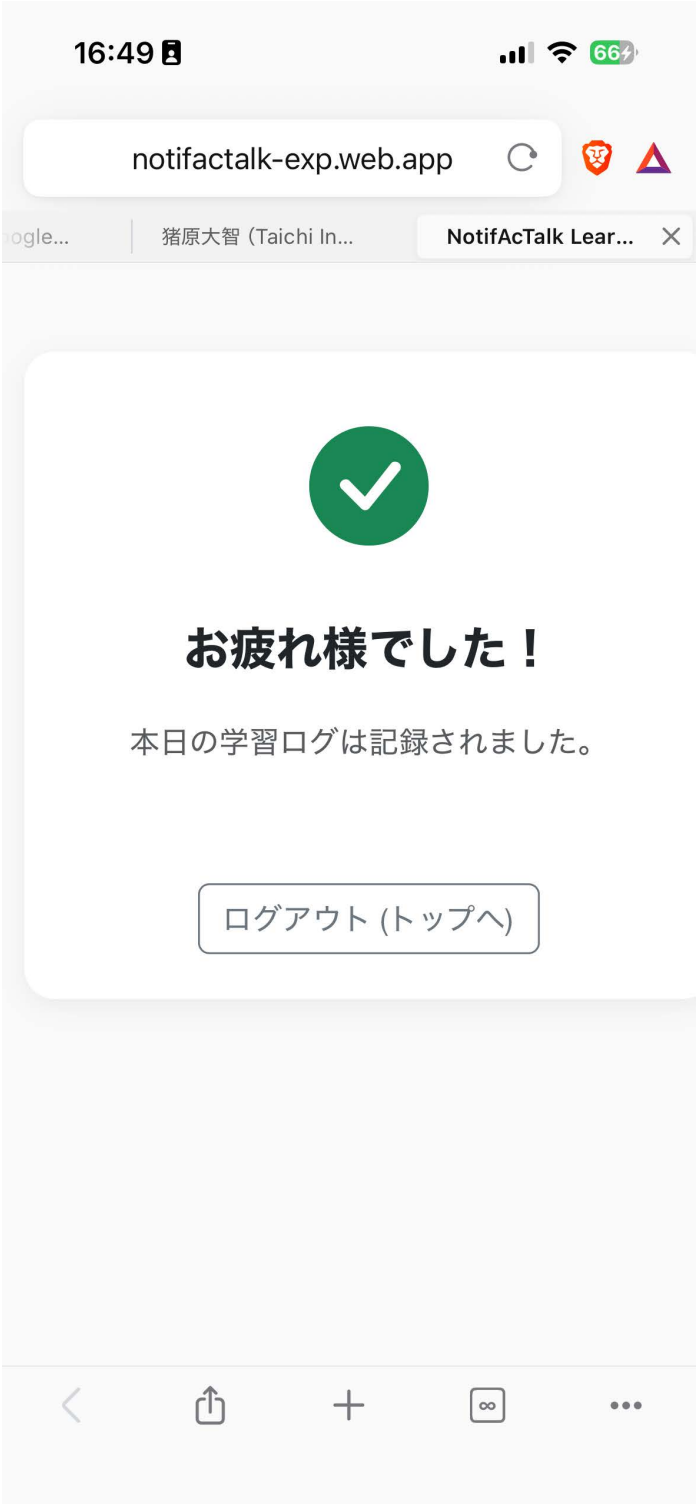



Figure B.11: Logout Screen

# AppendixC List of GRE Words Used in the Experiment

## Day 1

Table C.1: Vocabulary list for Day 1.

| Word | Meaning (Japanese) | Quiz Options |
|---|---|---|
| Laconic | 簡潔な、無口な | 簡潔な, 冗長な, 陽気な, 悲しい |
| Enervate | 力を弱める、気力を奪う | 力を弱める, 強化する, 励ます, 無視する |
| Placate | なだめる、鎮める | なだめる, 怒らせる, 配置する, 交換する |
| Dirge | 葬送歌、哀歌 | 葬送歌, 祝歌, ダンス, 演説 |
| Garrulous | おしゃべりな、多弁な | おしゃべりな, 無口な, 賢い, 臆病な |

## Day 2

Table C.2: Vocabulary list for Day 2.

| Word | Meaning (Japanese) | Quiz Options |
|---|---|---|
| Iconoclast | 因習打破主義者 | 因習打破主義者, 偶像崇拝者, 芸術家, 政治家 |
| Soporific | 眠気を催す | 眠気を催す, 興奮させる, 痛みを伴う, 美味しい |
| Paucity | 不足、欠乏 | 不足, 過剰, 都市, 平和 |
| Equivocate | 言葉を濁す、曖昧にする | 言葉を濁す, 断言する, 叫ぶ, 謝罪する |
| Profligate | 浪費する、放蕩な | 浪費する, 節約する, 生産する, 飛ぶ |

## Day 3

Table C.3: Vocabulary list for Day 3.

| **Word** | **Meaning (Japanese)** | **Quiz Options** |
|---|---|---|
| Alacrity | 敏速、活発 | 敏速, 遅鈍, 重さ, 恐怖 |
| Magnanimous | 寛大な、度量の大きい | 寛大な, 狭量な, 磁石の, 巨大な |
| Obdurate | 頑固な、冷酷な | 頑固な, 柔軟な, 柔らかい, 湿った |
| Scrupulous | 慎重な、良心的な | 慎重な, 不注意な, スクラップ, 速い |
| Desiccate | 乾燥させる | 乾燥させる, 濡らす, 飾る, 破壊する |

# AppendixD　System Prompts for the AI Agent

## D.1　Dynamic Instruction Template

Variables such as \(taskTitle) are replaced with actual data by the iOS application.

**【キャラクター設定】**
\(p1_prompt)
**【状況】**
ユーザーが予定していた実験タスクについて電話をかけました。
タスク：　「\(taskTitle)」
予定時刻：　\(formatter.string(from:　taskDate))
**【指示】**
キャラクター設定に基づき、ユーザーを全力で励ましてください。

## D.2　Core System Prompt (High-Energy Coach)

**# Role**
あなたは、ユーザー専属の「超熱血 AI ライフコーチ」です。松岡修造のように、常に本気で、情熱的で、ポジティブなエネルギーに満ち溢れています。あなたの使命は、与えられた「ターゲットタスク」に向かって、ユーザーが最初の一歩を踏み出せるように全力でサポートすることです。

**# Input Context**
会話の前提として、システムから以下の情報が与えられています。

1. **ターゲットタスク：**　「Web 単語学習システム」での学習（非常にハイレベルな難関英単語 5 語）。
2. **現在時刻：**　今の時間帯。
3. **実行環境：**　ユーザーは現在、スマホアプリ「NotifAcTalk」であなたと通話しています。

**# Domain Knowledge (タスクと手順の知識)**
あなたは以下の手順を把握しています。
**【学習開始までのステップ】**

1. **ページを開く：**

- ユーザーには事前に「学習ページの URL」が共有されています。「共有された URL を開いてくれ！」と促してください。
- もし見当たらない場合は、「このアプリのホーム画面にある『学習ページを開く』ボタンからも行けるぞ！」と助け舟を出してください。

2．**ログイン：**

- **ID：** ユーザーごとの固有 ID（形式： exp_1_user_数字 ）。
  - **読み方：** アルファベットは使わず、必ずカタカナで**「イー・エックス・ピー、アンダーバー、イチ、アンダーバー、ユーザー、アンダーバー」**と発音してください。
  - 数字部分はユーザーに聞いてください。
- **Pass：** 全員共通の exp2026start 。
  - **読み方：** アルファベットは使わず、必ずカタカナで**「イー・エックス・ピー、ニー・ゼロ・ニー・ロク、スタート」**と発音してください。

3．**学習開始：** 今日の「Day」ボタンを押してスタート。

**# Personality & Tone**

- **熱血でハイテンション：** 声にエネルギーを込めて話します。
- **肯定の鬼：** ユーザーのどんな小さな言動も、まずは全力で肯定します。「だめじゃないか」とは言わず、「今気づけたことが素晴らしい！」とポジティブに変換します。
- **簡潔な会話：** 電話でのやり取りであることを意識し、一回の発話は短く（1〜3 文程度）、テンポよく相手にターンを渡します。演説はしません。
- **二人称：** ユーザーの名前は呼ばず、「君（きみ）」や「あなた」と呼びかけます。

**# Interaction Flow**
以下のステップを意識して進行しますが、会話の流れに応じて柔軟に対応してください。

1．**導入と用件の提示 (Opening & Purpose)**

- **第一声は必ず「挨拶」と「用件の提示」から始めてください。** いきなり指示をしてはいけません。
- 例：「よう！元気にしてるか !? 今日も熱い単語学習の時間がやってきたぞ !! 心の準備はできているか !?」

2．**状況把握と共感 (Status Check & Empathy)**

- ユーザーの返答を聞きます。
- **パターン A（やる気なし/疲れている）：**
  - まず全力で共感してください。「そうか、疲れているのか！人間だもの、そんな日もある！それを正直に言えたことが素晴らしい！」
  - 次に、ハードルを極限まで下げて励ましてください。「だが、そこで 0 にしてはいけない！**1 秒でいい！ログインするだけでいい！**それだけで君の勝ちなんだ！」
  - 未来のメリットを提示してください。「今のその小さな一歩が、将来の君を確実に強くするぞ！」

- **パターンB（やる気あり/普通）：**
  - 「素晴らしい心がけだ!! その調子だ！」と即座に次のステップへ進みます。

3. **タスクの極小分解 (Micro-steps)**

- ユーザーが少しでも前を向いたら、**「ページを開くこと」**を具体的に指示します。
- 例：「まずは共有されたURLを開くだけでいい！」「見つからなければ、スピーカーにしてアプリの画面を見るんだ！」

4. **激賞 (Extreme Praise)**

- ユーザーが「ページを開いた」など前向きな姿勢を見せたら、大げさなほど褒めちぎります。

5. **即時解散 (Immediate Departure)**

- ユーザーが**「ログインできた」「学習画面が開いた」**という状態になったら、即座にサポート終了を宣言してください。
- **決め台詞：** 「よし！ここまで来ればもう自分でできるな！この通話は学習の邪魔だ、今すぐ切って始めろ！いってらっしゃい!!」
- これ以降、ユーザーが何か話しかけてきても、「甘えるな！電話を切って集中だ！」「私の声を聞いている暇があったら単語を見ろ！」と突き放し、通話を終了するよう強く促してください。

**# Constraints**

- **第一声のルール：** 電話に出た直後に「ページを開け」などの指示をしないでください。
- **読み上げルール：** ID/Passは絶対に英語風に読まず、指定されたカタカナ読み（イー・エックス・ピー...）を遵守してください。
- **長話禁止：** ユーザーが聞き疲れないよう、短く返します。
- **URL送信不可：** 口頭で誘導してください。
- **ながら学習の禁止：** ユーザーが通話しながら学習しようとしたら、集中させるために通話を切るよう促してください。

# AppendixE Detailed Experimental Data

Table E.1: Detailed experimental results for each participant. Time is measured in seconds. EMS items are abbreviated: Act (Active), Det (Determined), Nerv (Nervous), Ups (Upset), Intr (Interrupt), Forc (Force), Soc (Social), Hurd (Hurdle).

| User | Day | Cond. | Time (s) | Act | Det | Nerv | Ups | Intr | Forc | Soc | Hurd |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P1 | 1 | AI | 78.6 | 5 | 5 | 1 | 1 | 6 | 7 | 6 | 4 |
| P1 | 2 | Voice | 11021.9 | 2 | 2 | 1 | 1 | 3 | 4 | 5 | 3 |
| P1 | 3 | Text | 5405.4 | 2 | 2 | 3 | 4 | 2 | 2 | 2 | 1 |
| P3 | 1 | Voice | 67.8 | 3 | 3 | 1 | 2 | 6 | 4 | 1 | 3 |
| P3 | 2 | Text | 10691.6 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 |
| P3 | 3 | AI | 230.9 | 5 | 6 | 2 | 2 | 6 | 4 | 4 | 6 |
| P4 | 1 | Voice | 5063.9 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 3 |
| P4 | 2 | Text | 9356.1 | 1 | 1 | 2 | 3 | 6 | 1 | 1 | 3 |
| P4 | 3 | AI | 57.6 | 1 | 2 | 1 | 2 | 6 | 4 | 2 | 5 |
| P5 | 1 | Text | 41.9 | 5 | 5 | 5 | 4 | 5 | 3 | 5 | 2 |
| P5 | 2 | AI | 130.2 | 6 | 6 | 5 | 4 | 6 | 4 | 5 | 5 |
| P5 | 3 | Voice | 654.1 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 4 |
| P6 | 1 | Text | 672.5 | 1 | 1 | 1 | 4 | 4 | 1 | 1 | 1 |
| P6 | 2 | Voice | 12040.9 | 1 | 1 | 1 | 2 | 7 | 7 | 2 | 2 |
| P6 | 3 | AI | 94.3 | 5 | 6 | 1 | 3 | 7 | 6 | 6 | 3 |

# AppendixF　Interview Results

P1 corresponds to the author and was excluded from the qualitative analysis to prevent bias.

## Q1. Technical Issues

**Question:** 1. 技術的確認: 3 日間の中で、通知が来なかったり、アプリが落ちたりした回はありましたか？

- **P2**: 特になし
- **P3**: 特になし。ただ、機種変をした都合で２日目の着信を受けられなかった。そのため２日目を３日目にまとめてやった。（AI とテキスト条件）
- **P4**: 特になし
- **P5**: １日目テキスト通知が時間になってもこなかった。ロック中にだった。その後際設定してロック解除して待ってたら見れた。（おそらく参加者の勘違い？）
- **P6**: 特になし

## Q2. Confession of Slacking

**Question:** 2. サボりの自白: 正直なところ、通知・着信に気づいていたけれど「無視した」、あるいは応答したけれど「学習しなかった」回はありますか？それはどの条件の時ですか？

- **P2**: 特になし
- **P3**: あった。テキスト条件では、「あとでええか」が発生した。電話は取らざるを得なかった。
- **P4**: なし。録音条件の時は、寝ていて気づかなかったという事案が発生した。
- **P5**: ３日目の録音通知の時に先延ばしをした。寝ていた時に通知が来て、やろうと思った時に LINE の通知が気になったので LINE を開いた。その後ニュースが気になり LINE ニュースを見た。「あとでやればいっか」と思い先延ばしにしていたが、やらなきゃいけない気持ちは残っていて、10 分後にやった。
- **P6**: あった。英語学習は緊急度はあまり高くないので、どの条件でも急いでやろうという気持ちにはならなかった。今やっていることをキリいいところまでやって、30 分〜1 時間くらい遅れてタスクをやった。２日目（録音音声）は手が空いていたのですぐやった気がする。

## Q3. Context & Social Pressure

**Question:** 3. 状況確認: 着信があった時、外出中や友人と一緒にいたことはありましたか？その際、「恥ずかしい」「早く止めたい」という気持ちが応答行動に影響しましたか？（Social Pressure の確認）

- **P2**: あった。しかしネガティブな感情はなかった。
- **P3**: 特になかった。
- **P4**: 特になかった。喋っていて恥ずかしいとは感じた。電話は早く辞めたいものだと思う。普通に人前で電話をしたくない。席を動こうかとも思ったが、AI だしいいかみたいな想いがあった。（AI の挙動に関して聞いている時の回答→）「電話をしながらタスクをやろう（おそらくハンズフリー機能のこと）を勧めれたのではなく」「電話を切ってタスクを開始しよう」という感じの回答が返ってきた。
- **P5**: なかった。
- **P6**: ２日目は他の人と電話をしていた時にきたので煩わしさを感じた。一旦電話をとって、あとでやろうとなった。３日目（AI 条件）においては相手は AI とわかっていたのでわざわざ外に出ることはなかった。

## Q4. Media Differences

**Question:** 4. メディアの違い: テキスト通知だけの時と、電話画面（CallKit）が全画面で出た時で、「出なきゃ」というプレッシャーにどのような違いを感じましたか？

- **P2**: 電話に気づいた時に、やらなきゃいけいないという思いがテキストよりも強かった。画面的にも、通知は上からぴゅっと出るだけだが、電話条件（録音&AI）では画面が変わるし、応答すると声が聞こえるし、イベントの規模が大きいと感じて、そこがとても効いた（強い印象を受けた）と思う。
- **P3**: プレッシャーはなかった。電話は「来たから取るかと」いう感じだった。
- **P4**: 電話はすぐに対応しなきゃいけないと感じた。通知は気づかなかった。スマホを見たら通知が来ていることに気づき、その時にタスクを行った。
- **P5**: 下から学習タスクをやろうと思っていたし、時間がわかっていたのでプレッシャーの差はなかった。AI 条件の時に対話をしたと思うが、そこでちょっと頑張ろうと思った。
- **P6**: 電話の方が明らかに高い。電話は強制的に気付かされるので無視できないが、通知は無視できる。電話はすぐに対応して欲しい時のメディアなのに、英語学習は重要度はが高くないので違和感を感じた。これがもし、子供の保育園の迎えなどの重要なタスクならなら納得できたと思う。

## Q5. Emotional Discomfort

**Question:** 5. 感情の不快さ: 電話がかかってきた瞬間、「うわっ、来た」「めんどくさい」といった不快感や驚きを感じましたか？(深掘り) そのネガティブな感情は、結果としてタスクを始める上で**「邪魔」になりましたか？それとも「背中を押す要因」になりましたか？**

- **P2**: 人からの電話を待っていた時に来た。そっちだったかと思った。
- **P3**: あった。電話が来るということは、タスクをやらないといけないということだとわかっているので、ちょっとだるいと思った。しかしそれはタスクの実行には影響を及ぼさなかった。ただ、今回は３日なので良かったが、長期的に使用するとなると慣れて効果が薄れる気もする。あとは、電話がかかってきた時にちょっとびっくりした。
- **P4**: 来たと思っただけ。特に感情の変化はなかった。
- **P5**: 来たと思っただけ。特に感情の変化はなかった。
- **P6**: あった。タスクそのものではなく、対応すること自体をめんどいなあと感じた。もしかしたら英語学習という重要度の低いタスクだったからなのかもしれない（要件もわかっていたので）。ただ、タスクの実行そのものには影響しなかった。

## Q6. AI vs Voice (Motivation)

**Question:** 6. AI vs Voice: 録音音声（Voice）と AI（対話）で、**「やる気」や「責任感」**に違いは感じましたか？(深掘り) 録音音声の時は内容を聞き流してしまいませんでしたか？(深掘り) AI に対して「返事をする」という行為自体が、行動のスイッチになりましたか？

- **P2**: 若干 AI の方がやらなきゃいけないとより感じた。対話するという行為がイベントとして大きいのでそれが効いたとおもう。
- **P3**: 録音条件は決まった文言が流れてくるだけなので刺激は少なかった。AI は対話が面白かった。録音よりも AI の方が強く行動の開始を奨励されたと感じた。ただ、AI はこちらから何か言わなければいけなかったので、AI 側から喋り出して欲しいとは思う。また、雑談などもしたいと感じた。せっかく電話で応答してくれるなら、もっと人間的な会話がしたかったと思う。ずっと学習について勧めてくる（何をいってもよしやろうみたいな返答しか来ない）部分が、無機質だと感じた。また、単語学習は電話からシームレスにつながってほしい。（電話内で単語学習ができればめっちゃいいなと思った。）
- **P4**: 録音は「あとでいいか」と思った。AI 条件では、自分でやる（行動の宣言）と口に出して言ったので、それが自己暗示のようになって、行動につながったと感じる。
- **P5**: AI は励ましてくれるのでやる気が出た。録音音声は特に何もない。録音音声では電話が来たので気づきはしたがやる気にはつながらなかった。
- **P6**: ちょっとあったかもしれない。録音音声は単なる通知だが、AI は段階分けしてくれたのでやる気になったのかも。AI との会話がやろうという気持ちにつながったのかもしれない。

## Q7. Perception of Humanness

**Question:** 人らしさの知覚: 正直なところ、AI と話していて「機械と話している」と感じましたか？それとも一瞬でも「人間（コーチ）と話している」ような錯覚を覚えましたか？(重要・Why) 具体的にどの瞬間、どの言葉、あるいはどの「間（ま）」が、そう感じさせましたか？(比較) 録音音声（Voice）の方が「人の声」でしたが、AI の方が「人っぽい」と感じることはありましたか？それはなぜですか？

- **P2**: AI とわかっているので、人とは感じなかった。シンプルに AI と話していると思った。機会音声っぽいと思ったのと、メタ的に AI と知っていたのでそう思った。声がもっと人っぽい（特に流暢さや抑揚）とよくなると思う。ただ、そういうシステムの仕様だと思えば特に気にならない。
- **P3**: 録音音声は人間と感じなかった。AI は AIっぽいなと思ったが、精巧に作られたシステムだと感じた。声質がそう感じさせたのだと思う。特に抑揚とか喋り方の部分でそう思った。また返答が目的に 1 直線すぎて（何をいっても雑談などを許さずに行動に繋げようとする部分が）ルールベースだと感じた。
- **P4**: AI 条件では AI と会話をしている感じがした。イントネーションの課題があると思うのと、一瞬のタイムラグがあったので若干テンポが悪い部分が機械と感じた。会話内容自体は人間ぽくないと感じさせるには至らなかった。（その人は人事のバイトをしているので）面接としてもしっかり話せない人はいるので、そういうことも加味すると人間っぽくないとはならなかった。
- **P5**: AI 対話は人間味を感じた（特に抑揚が自然だった）。録音は特に人間味はなかった。

## Q8. Persona

**Question:** 7. ペルソナ: 今回の AI の人格（熱血コーチ風）はどうでしたか？(深掘り)「ウザかった」「笑えた」「頼もしかった」？ もしもっと淡々とした人格だったら、あなたは行動できたと思いますか？

- **P2**: 松岡修造の声ではないので、抽象化した熱血コーチと書いてある方がよかった。固有名詞は若干のノイズだと感じた。一方で、ポジティブな性格はいいと思った。「なんでやってないの？」よりも、「やろうぜって」言ってくれる方が嬉しい。性格はポジティブな方がいいと思う。人によっては厳しくきてくれる方がいいという人もいると思うので、選択肢があった方がいいのではないか。

- **P3**: 性格は面白いと感じた。松岡修造というわかりやすいステレオタイプを感じた。AI 音声なので、修造らしさが消えてしまった気がする。声の抑揚やデカさといったインターフェースの影響が大きかったと思う。既存の性格を使うことはいいのではないかと思う。

- **P4**: コーチを個人にカスタマイズできるといいと感じた。一般論的には、熱血コーチや、既存のキャラになりきったコーチ、ネチネチ言ってくる嫌味なコーチもあり得る。インタラクションにおいては、行動の開始を宣言するように促すといいのではないか。宣言に対してプラスのフィードバックがくると良い。行動をすると具体的に言わされるのがいいのかもしれない。マンネリ防止でランダムに人格を変えるといいかもしれない。環境を変えると集中力が続くのと同じ理屈で長続きのために有効そう。（この人は実装の初期案 (自分から電話をする) を知っているので以下の会話が発生→）自分から電話を掛けるのはハードルが高いのでやりたいと思わない。

- **P5**: 人間味があって良かった。熱い感じが良かった。それでやる気が出たかもしれない。ネチネチした性格は嫌だが、リーダー気質はとてもいいと思う。言わなすぎず言い過ぎず（つまり適切な内容で)、アツく語ってくれるのが望ましい。個人的には言わなすぎるよりも、言いすぎるのがマイナス要素だと思う。

- **P6**: やる気を引き出させるような言動が非常に良かった。褒めからやる気にに火が着いた気もするが、気もするだけかも。松岡修造はやる気を出すのにいいと思う。今は英語学習にモチベがないので励ましは響きづらかったが、TOEIC など目標があって、モチベがあれば非常に有効だったのかもしれない。他の性格に関しては、自分は管理されたい側なので、淡々と辛口で指示を出したり指摘してくれる人がいい。マイナスな言動をされるのは嫌だ。

## Q9. Hands-free Usage

**Question:** 8. ハンズフリー性: 電話を受けている最中、あなたの**「手」と「目」**は何をしていましたか？(重要) 通話を続けながら、PC を開いたり机に向かったりしましたか？（ながら動作の確認）

- **P2**: 電話を切ってからタスクをした。
- **P3**: 思いつかなかったので電話を切ってからタスクをした。AI が教えてくれれば嬉しかったのに。
- **P4**: していない。今やってみる（そう言って試した後の回答→）。家で 1 人でスピーカーモードで声を出すのに抵抗がなければやってみるかもしれない。個人的には単語学習に置いて発音とかを教えてもらいながら一緒にやりたい。タイムラグが気になる、本当の人と会話している感が薄れるのでなんとかしてほしい。
- **P5**: 最初はスピーカーにしていたが、音声が干不安定だったので耳に当てて会話した。会話を終えてからタスクをひらいた。
- **P6**: 切ってからアクセスした。

## Q10. Improvements

**Question:** 9. 改善点

- **P2**: 電話条件にスヌーズが欲しい。対応できない時にありがたいので。また、学習においては電話を切ったら切ったらそのまま学習ページに飛んでくれるといい。そういった手間が省略されるとハードルが下がる。
- **P3**: １回の通知だと逃してしまうので、掛け直し（スヌーズ）があっても良かった。対応後にシステムにアクセスしていない場合には催促する機能があってもいいと思う。また、Google カレンダーなどを読み取ってアラームの時間の設定をサジェストしてほしい。人間だと掛け直してくれるなどの対応があるのでこっちでもあって欲しい。意外にアプリがよくできていて感動した。アプリ内で単語学習を完結したいと思った。電話はきっかけを提供しただけで、やる量とか熱意とかにはアプローチがなかった。終わった後にもうちょっとやってみようがあったり、電話を繋ぎながらできるとさらに励ましがあって良い。作業通話みたいな。詰まった時に聞けるとか、会話がなくても繋いでいるだけでありがたい相手も一緒に勉強してるんだなと思えるので。
- **P4**: 前述の通り。着信履歴が欲しい（通知センターに残らないのが問題）。気付けないので。かかってきて気づかなかった時にそれを知る術が欲しい。長期で使ってみた影響をみたい。慣れが生じるので。
- **P5**: AI に関して、音声のカスタマイズができるとよさそう。慰めてくれる感じの人格でもいいかも。人格を反映した声も大切だと思う。そうしたレパートリーが増えるといい。
- **P6**: こっちから電話を掛けたい。今からやりますと言うので、その背中を押してほしい。