

# Designing a Game Based Approach to Tobacco Abstinence

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**Abstract:** Smoking relapse remains a significant public health concern with high costs. Behavioral rehearsal can help smokers master coping skills to manage smoking urges. A collaborative team of doctors at Memorial Sloan Kettering Cancer Center and game designers at Muzzy Lane software have been exploring the potential of a game-based approach to this challenge, focusing on post-operative cancer patients who need support to avoid resuming smoking when returning home.

The team has developed multiple game prototypes, and tested these prototypes with our target audience and expert reviewers. Both the design and testing have yielded unexpected insights: Because much of the work of smoking abstinence is internal, we developed game mechanics for “internal dialog” that work alongside other mechanics for conversation, and that allow players to practice a variety of coping skills. We will report on what we have learned in Phase 1 of the project, and what next steps will be in this ongoing project.

## Significance

This project’s aim is the development of a smoking urges coping skills game to decrease post-hospitalization smoking relapse in tobacco dependent cancer patients. This remains a highly significant project for several reasons. While effective treatments for tobacco cessation do exist, relapse rates remain high and innovative interventions specifically designed to prevent relapse are needed.

Our team started with the idea that a coping-skills game could offer several advantages to traditional behavioral treatment: It can be practiced multiple times at smokers’ convenience to address their specific smoking triggers; It can create realistic simulations that provide behavioral rehearsal opportunities that are not possible in real-world treatment settings (e.g. social smoking situations); it can be readily disseminated to a broad audience of tobacco-dependent patients without resource-intensive programs; and it can be cost-effective as the initial outlay of costs can be recouped with wide access and re-use.

## Project Overview

Supported by a NIDA grant, we have undertaken a design-research project to develop and test a series of prototypes, with initial aim of arriving at the game mechanics that have the greatest potential for success.

We have created two prototypes, and tested them with a population of medically ill smokers. In this paper, we report on the findings from both the design work and the testing. Results from the early prototyping resulted in the ‘invention’ of new mechanics—and testing results showed both promise and work to be done. We plan in the next phase of the project to complete a third version of the game, building on what we have learned, and then do a randomized clinical trial design (Usual Care + Smoking Cues Coping Skills Game vs. Usual Care Only) to test whether the game increases coping self-efficacy and smoking abstinence among hospitalized cancer patients.

## Design Research Work

Design and development has been a collaborative process with the two PIs leading individual teams at MSKCC and at Muzzy Lane Software. The team began work with discussions of earlier research by our medical team, and of a wide array of game mechanics and approaches that we might draw upon.

We then developed an initial design approach over the next month. It included a key concept based on patient profile discussions: Patients would not play “themselves”—instead, the game would feature one or more relatable characters in situations that would present challenging situations within which to practice coping strategies for managing smoking urges.

Based on this design direction, a non-electronic prototype was produced (using board-game metaphors) to allow the team to review the concepts and gameplay with the Patient Advisory Group (PAG), which met on May 11 at MSKCC. At the PAG session, the team received valuable feedback that led us to finalize several key aspects of the Phase I design. The key feedback points were:

- Patients did not want to be presented with a game that depicted smoking cessation as “lightweight or tried hard to be entertaining” (a PAG member). The PAG member commented that he would be interested in learning from the serious struggles of his and others’ quitting experiences.
- Patients appreciated the narrative element of the paper prototype, and were inspired to tell their own stories in response. This solidified our belief that the narrative would be important for our target population.
- The group highlighted the importance of their internal struggle to cope with urges to smoke, which were seen as more important than external (environmental) triggers. For them, the struggle went on largely in their heads. We realized we needed a way to incorporate this element into a key design innovation, which became known as Internal Dialog.

### **Updated game design based on paper-prototype feedback**

To address the issues raised during the PAG meeting, the team devised several key design innovations and made a variety of decisions in the planned product structure. We believe these design changes will greatly increase the impact of our planned Phase II product. The changes were:

- **Internal dialog system:** This system gives the player control of the game avatars’ thoughts, as well as their conversation and actions.
- **Counter-thoughts coping mechanism:** As part of the internal-dialog system, we were able to model the concept of counter-thoughts that the player/avatar can use to count negative (tempting) thoughts about smoking.
- **Challenges:** Organize the game as a series of 10-15 “Challenges” rather than one “Game”.
- **Multiple characters:** Include three different characters in order to give a wider range of characters to which patients can relate. We also plan to have the narratives of the characters connect with each other to sustain motivation and propel patients to play new “challenge” situations.

### **Development of the Smoking Cessation Game Prototype**

Once the product and game design were reviewed and approved by the full ML and MSKCC teams, we specified the subset of the full product that would be produced as a prototype for testing. We specified that the prototype would include:

- One complete “Challenge” or unit from the fully envisioned product, with all the features and functionality we would expect a unit to include. This included a 3D game scene with three characters working through one challenging situation.
- An initial project website from which the Challenge could be played. The website would also provide a menu of additional envisioned challenges and project and character descriptions to give PAG reviewers necessary background for playing the game.

### **Character and environment design**

The characters and environments needed to meet several challenging criteria: We wanted environments to be somewhat realistic, but also environments that patients would be willing to spend time in virtually.

We also wanted the environment to be relatable: We had learned from earlier interviews that patients were more willing to fully enter the experience if they felt it related to their own struggles as smokers.

Characters needed also to be sympathetic to the patients from a broad range of social and ethnic backgrounds. Characters were designed to have a solidity and straightforward naturalism, while NOT being realistic in detail. We wanted to avoid the “uncanny valley” of characters that are a little too realistic, and therefore end up being off-putting, as viewers compare them to reality and find them wrong.

## Narrative Writing

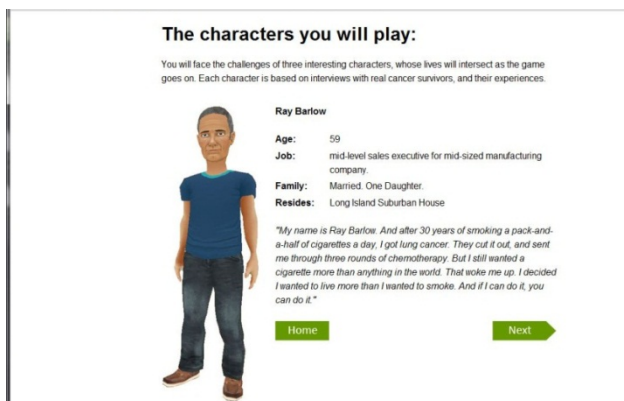
Since we understood that narrative would be an important part of the project, we added an experienced play and television scriptwriter, to the team. He has written for the stage, for public television, and is currently an artist/writer in residence at MIT. His scripts and dialog were praised by testers as both feeling “real”, capturing the challenges patients faced, and adding some appropriate humor. With the addition of Internal Dialog (along with Conversation and Coping Actions), we needed to develop a new format for our scriptwriting, which will be useful going forward.

## The Second Prototype

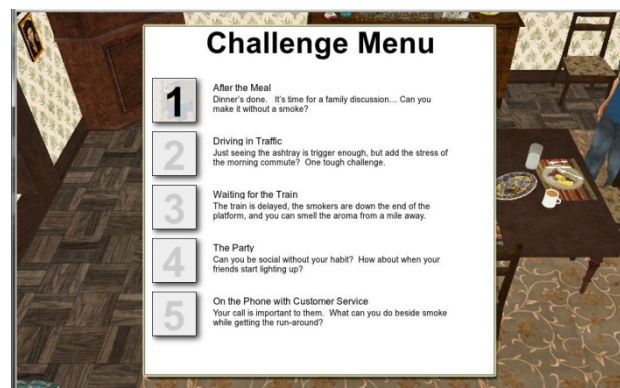
The second Prototype was completed in July and deployed to the project website and tested internally at MSKCC in preparation for review and testing with patient volunteers. The following captured images show the major elements of the Prototype:

## Screens from the Prototype

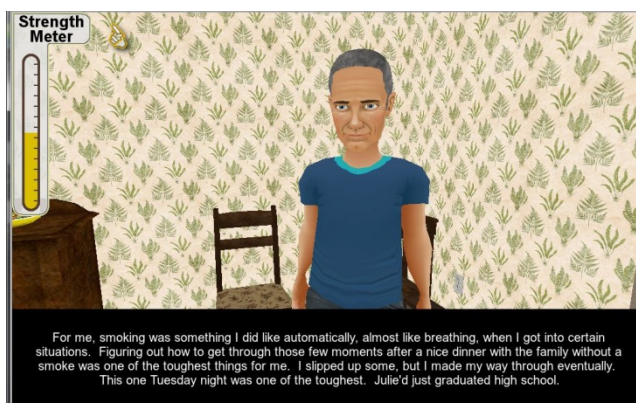
The following screens show the main elements of the second Prototype:



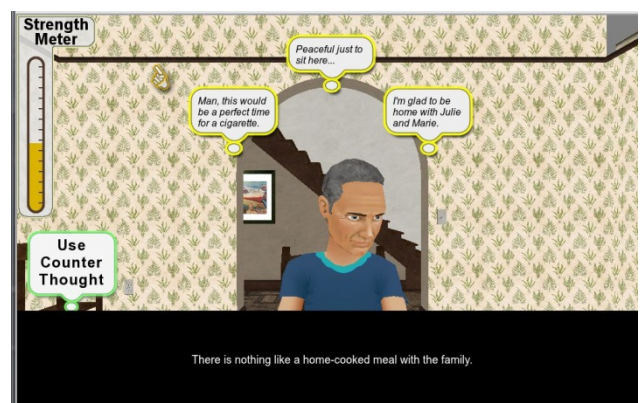
**Game characters:** Patients will choose from three or more characters. The prototype featured this character.



**Challenge menu:** Patients will choose from 15 challenges in final product. Prototype included one challenge.



The character (Ray) introduces the Challenge.



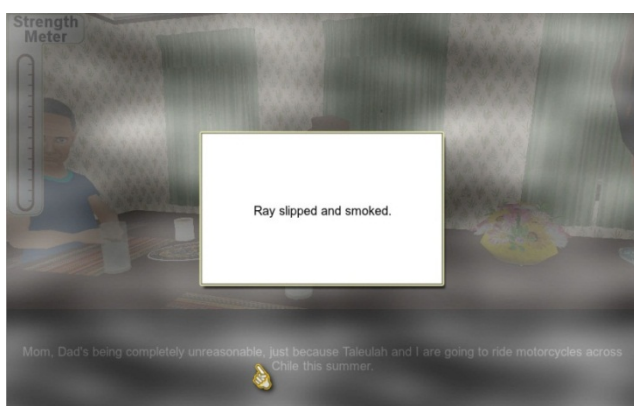
**Interior Dialog:** The patient can choose what Ray thinks next. Patient can also use Counter Thought to neutralize a negative “trigger” thought.



**Conversations:** The patient engages in the situation by controlling conversation with other characters in the scene.



Coping strategies for managing smoking urges: The environment also includes a variety of coping strategies the patient can utilize and practice—in this case, petting the cat.



**Slipping:** If the character (Ray)'s strength (to resist urges) is reduced to zero, Ray slips and smokes. This outcome is what the player is working to prevent.



**Post slip:** The participant can practice ways to recover from a slip—in this case through dialog.

## Expert Panel Review and Feedback

We conducted interviews to introduce the game and solicit feedback on the prototype from five external consultants with expertise in the development and evaluation of tobacco cessation interventions. These consultants were provided with off-site access to the prototype game and were requested to provide specific feedback on the game relevance, usability, and utility. Overall, the experts found the game to be engaging, novel, and appreciated the value and appeal of the narrative story for player engagement. The following four primary themes and suggestions emerged from the Expert Panel:

**Add a clear and compelling initial orientation providing goals.** The experts recognized that our intended users are not experienced game players and therefore suggested that greater attention be paid to “setting the stage”, and framing the game as intended to be a helpful way of practicing ways to manage challenges faced by smokers in their efforts to become smoke-free.

**The user interface will benefit from more explicit instructions for manipulating the game environment.** Similarly, the experts perceived that less experienced game players might find it difficult to engage the interactive elements of the game environment and suggested that a narrator and/or “help” icon could help players navigate and manipulate the game environment. Although they liked the overall concept of selecting and being encouraged to use Counter Thoughts as coping strategies, this was one formatting element in which the experts felt that either a demonstration or explicit coaching from a narrator would be needed.

### **The avatar should allow a broad range of patients to identify with the game characters.**

There was a lengthy discussion about whether players should play themselves or a game character. One expert suggested that being able to build, select and personalize the “look and feel” of the avatar is a fun way to increase players’ game engagement. All agreed that having choices with regard to character selection and options for play enhance relevance. Additional suggestions included more reference to the cancer and its treatment.

### **Experts provided suggestions for making the game more engaging by providing greater reinforcement for positive or negative game decisions.**

Several comments focused on improving the ways in which we presented the rise and fall of the player’s “urge to smoke.” One expert suggested adding more explicit praise and encouragement for constructive use of coping strategies (“the narrator could praise players for effective coping”). Another expert suggested that effective use of coping strategies be reinforced with evidence of the character having powered-up (acquired some wisdom or mastery of coping strategy).

## **Patient Feedback**

As planned, we recruited 20 game tester volunteers who were adult cancer patients treated by the MSKCC Tobacco Cessation Program. Interested patients were scheduled to evaluate the game at the MSKCC Communication Skills Training Laboratory, where there are suitable digital media facilities for demonstrating and recording a participant’s interaction with the web-based computer game. Informed consent was obtained. Dr. Krebs conducted all patient feedback sessions. As testers navigated the game, we used a “think aloud” or “verbal protocol” approach, which is recommended for usability testing.

Participants were encouraged to verbalize their thoughts and raise questions as they explored the game. Testers provided feedback on the introduction, proposed character descriptions, and played through the prototype of an after-dinner scene with the avatar Ray and his family. Following completion of the scene, patients were asked a series of evaluative questions. Usability was assessed with the 10-item System Usability Scale (SUS), which has been found to have excellent reliability in assessing usability of computer systems. The SUS is scored on a scale of 1-100 with two subscales: Usability and Learnability.

As planned, patients represented a wide range of ages from 31 to 74 years, with a mean age of 56. Participants were 70% female, 35% identified as African American and 5% as Hispanic. Current smokers comprised 65% of the sample, and breast (40%), lung (20%), colon (10%), and prostate (10%) were the most common cancer diagnoses. 30% did not use a computer even occasionally and 80% had little or no prior use of computer games.

The testing items evaluated four domains: User Interface, Content, Overall Experience, and Usability. User interface, as defined by ability to figure out how to play the game, understand the instructions and text, knowing what a user is supposed to do, comfort in playing the game, and professionalism were rated at a moderate to high level, with means on a 5-point Likert scale ranging from 3.00 to 4.65.

Content items assessed the game’s utility in helping users manage smoking urges (M=2.90), prevent relapse (M=3.65), and apply content to their own lives. Patients rated content relevance at a moderate to high level (M=4.10). In terms of their game experience, patients reported moderate to high satisfaction (M=3.75), would strongly recommend it to other patients (M=4.70), and felt that it kept their attention (M=3.50). The Usability Scale (1-100) summary score was moderate to high (M= 67.00), a similar level observed with other commercial computer systems. The Usability subscale mean was (M=65.94) with high Learnability (M= 71.24). Finally, responses from open-ended questions and patient comments were transcribed and thematically coded.

Six primary themes emerged from the qualitative feedback:

### ***The user interface was easy to use once instructions regarding game play were provided.***

Patients described that it was easy “after initial guidance” and that the “meter going up meant I was doing well.” On the other hand, patients said “instructions needed to be more explicit” and that it was “sometimes confusing about what to do with the character.”

### **Patient experience with the user interface provides important data for a full game version.**

In the first sessions, we did not provide explicit instructions either within the context of the game or by the tester; we wanted to test to what extent the game should have explicit instructions versus a concept where patients discover the rules for themselves. It became clear that our completed version will require the game to begin with a demonstration and orientation. The simple clickable user interface succeeded in making the game accessible in that as soon as patients were given a brief introduction by the tester, even patients who never before had used a computer were able to play it easily.

### **Patients strongly identified with the smoking-related situations and struggle to remain smoke-free.**

When asked what they liked most about the game, patients strongly affirmed the authenticity of the after dinner scene in which they play the avatar, Ray, and choose his thoughts and dialogue. For instance, in terms of relating to the avatar, patients said, "I knew what he was going through. I related to the situations", and "I related to Ray; I was feeling everything he was feeling."

In designing a method for introducing users to smoking-related situations, we decided that users would play characters with partially-scripted scenes, rather than playing an avatar representing themselves in an open-ended scenario. The goal of this design choice was to make game play easy for novice users as well as to enable the game to introduce patients into common scenarios with which smokers struggle. Testing revealed that patients strongly identified with the character and dialogue of the situation; no patient stated that he or she would rather have played an avatar representing him or herself. Testers responded that:

- "I found myself projecting a lot"
- "There were enough choices to pick to match my own thoughts"
- "The thought choices were "spot on with what you'd say to yourself"
- Testers liked "trying to put myself in Ray's shoes and make the best choices in a positive way."

### **The process of game play demonstrated both behavioral and cognitive coping skills for remaining smoke-free.**

The game demonstrated cognitive coping skills by requiring users to choose Ray's thoughts and dialogue, which then influenced how the other characters responded to him. Behavioral skills were exemplified by enabling the character to choose strategies such as drinking water or deep breathing to cope with tempting situations.

Patient-testers responded that the game play was useful for teaching and reinforcing coping skills:

- "I like that I was brought along as the character, since it introduced me to new ideas about how to not smoke."
- In terms of what they will integrate into their own lives, patients reported: "to be mindful of thoughts and that you can stop yourself."
- To pause and make a choice, "I learned substitution, distraction, and avoiding cues that would make you want to smoke", showed me "I can do without and walk away," and that one tester found it helpful "...that you could make choices because that's a big part of quitting."

Our goal in design was also to show the mutual influence of the characters on each other. Testers readily picked up on this concept:

- "As he made choices, he received positive responses from his wife and daughter. His reactions shaped the outcomes."
- "That it's a bit like a real conversation in that you're not in control of how others in game react."
- "[The game] shows you how not to escalate situations and make things worse."
- "Communicates the importance of communication." "It's okay to ask somebody to go outside" and "Shows you it's not a singular fight; it involves everyone around you."

### **Patient-testers made suggestions for broadening the characters' diversity, adding coping situations, and for reflecting their own experiences with cancer.**

We had populated the prototype dining room with a small sampling of coping strategies in which Ray could engage. While patients identified with these, they also made suggestions for additional strategies:

- “He needs to be able to do more things.” Patients suggested puzzles, reading, going outside, exercising, doing artwork, praying, and clearing dishes.
- In more than one instance, patients noted a desire for more specific reference to cancer: “Choices for dialogue should reference cancer and recovery” that it should emphasize “Consequences of smoking such as recurrence”.

Creating a game that reflects and appeals to a diverse audience is an important goal of our project. Our testing sample was 40% non-Caucasian and 70% female, and thus well-represented in terms of diversity. Patient-testers expressed desire for: a “Female character in a management job”, that it needed a “dark-skinned character” and that we should “Add more races and realistic situations for those races.”

### **Testers noted suggestions for making the game more fun and fast-paced.**

While patients found the game interesting and engaging, they also expressed desire for it to have more elements of fun. Patients stated it “Would have to be more exciting”, and that Ray was a “glum character.” In line with typical expectations of a game, testers also wanted a reward structure:

- “I wanted a reward. I wanted it to keep score”, and that “winning reinforces positive coping.”
- Patients wanted the action to move along more quickly, finding that there were “too many thought choices at start” and that “all the choices slowed you down” and “took too long to read.”

### **The game offers strong potential to be useful for preventing relapse.**

In their summary comments, patients remarked that the game:

- “Reinforced tools and strategies I learned”, that it would “help me in situations where I have a pattern and see it differently”, it could “be a reminder, sometimes good reminder of choices and dealing with people who smoke” and that “if I’m slipping, it’s a good reminder, feels motivating.”
- Participants also liked the computer model in that “interactive is the way people are going to be taught”, and “I was fascinated because I’ve never seen anything like it.” Overall, it is “an excellent idea. Needs to be fine-tuned though,” that “you’ve struck gold” and that it was “well thought out.”

### **Conclusions and next steps**

This Phase 1 of the project has been highly valuable—lessons have been learned that will be invaluable in the second phase. Designing an effective game-based approach to a difficult, personal challenge like smoking-cessation requires both strong game design (in providing strong goals, rewards, good feedback, and interesting mechanics), and consideration of other issues:

- Because of the personal and truly life-and-death nature of the problem, patients/players are very sensitive to both the context of the game world and the authenticity of the characters:
  - Patients do not want to feel that the struggle is in any way trivialized.
  - Patients want the experience to feel grounded—to have a weight that matches the seriousness of their own struggle.
  - Characters must mix relatability and gravitas—their challenges must be believable and non-trivializing.
- Very simple and focused interfaces and mechanics are needed: This audience is often not familiar with standard interfaces and concepts of computer games, and does not easily see and absorb the multiple streams of information (scoring, meters, character action, dialog, etc.) that games can provide.
- Internal Dialog mechanics can work, but issues of complexity and sequence must be worked out: The players identified with the thoughts, and immersed themselves in the challenging situation of the character, and did in fact “practice in context”. But they were confused by some active-thought mechanics like Coping Thoughts.

We look forward to addressing these in issues in a new version of the game, and to the opportunity to run clinical trials to test that version.

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