2017

SYNERGY: GAME DESIGN + QUR'AN MEMORIZATION

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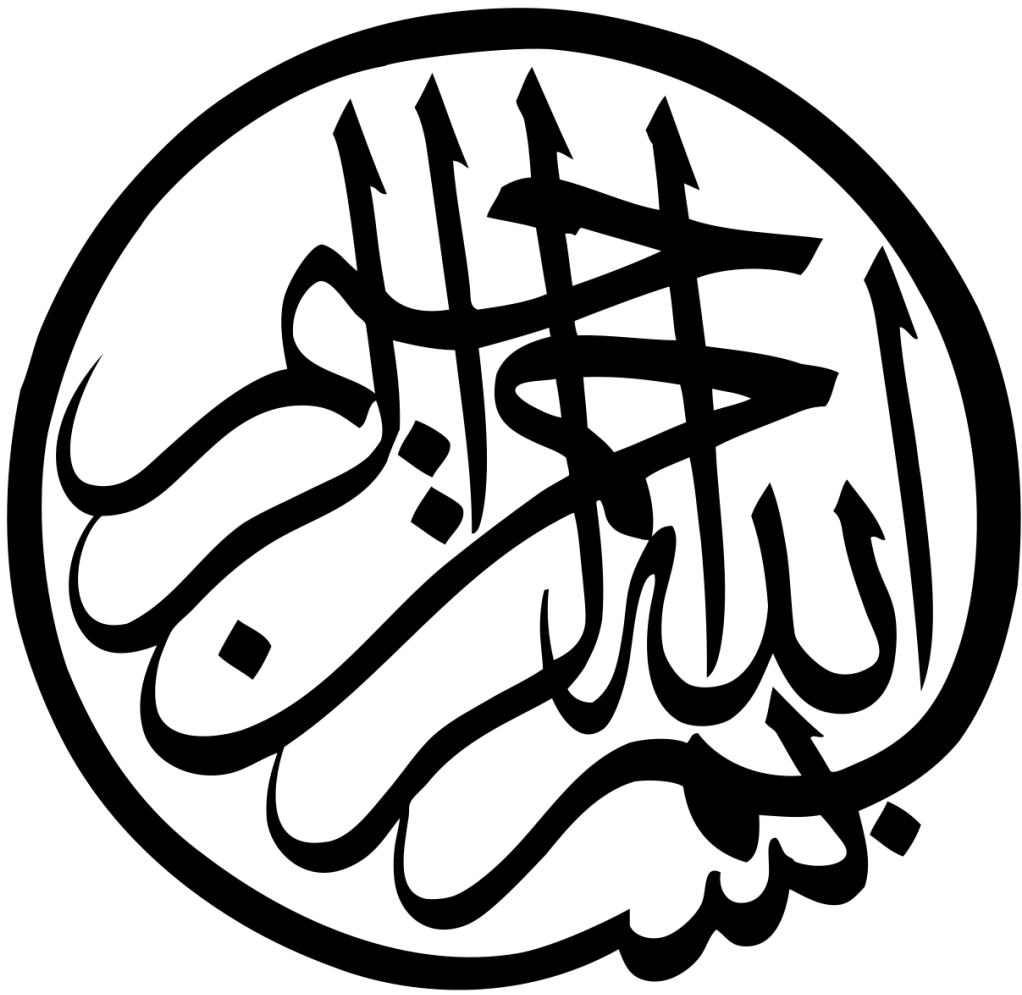
In the name of Allah, the Compassionate, the Merciful

acknowledgement

First and foremost, all thanks are due to Allah for His countless blessings, guidance, inspiration and assurance, without which none of this would have been possible.

I would like to express my sincere appreciation and gratitude to my committee, Rab McClure, Leland Hill, Jesse Ulmer, and Jörg Matthias Determann for their invaluable support and advice throughout this research journey. Your guidance has shaped me in innumerable ways. Special thanks to Rab for tirelessly supporting and motivating me until the end of this journey.

Thank you Marco Bruno for helping me etch the foundations of my research and your commitment during the summer break after the initiation of this research. I am indebted to Basma W. Hamdy, Craig K. Anz, Denielle J. Emans, Michael Wirtz, Peter Martin, Maryam Homaid, Ryan Browning, Haya S Daher, Saquib Razak and Richard Lombard (and many more who I am unable to enlist here), for their extended support and feedback. Each one of you have positively impacted my thesis in numerous ways. I am grateful to the VCUArts Qatar MFA faculty and staff for their support and guidance. Special thanks the whole VCUArts Qatar family. Aamir Masood, my sincere gratitude for always offering your time in running me through crucial questions with your user experience and marketing expertise. I want to thank Mrs. Wilkins for her constant

motivation throughout my thesis, and ensuring that I was taking care of my health, and focused on my goals along the way.

To Stefano Mirti, co-founder of Interaction Design Lab for introducing me to paper-prototyping, and being so generous to provide me brainstorming, and well as critical thinking sessions for this thesis, and most importantly being an anchor during my internship in Milan, Italy. Thank you VCUArts Dean of Qatar for the opportunity to receive a research grant which made this research internship possible.

To my dearest friend Neihan, thank you for listening to me and sharing your thoughts and encouragement whenever possible. My fellow juniors from the Graphic Design Departments, Aaqifah, Nimrah, and the Sarahs, Nimrah, for all your support through the animation process of the designed outcome. I could not have done this without your help, your live tutorials. Hala and Mona, thank you for the late night and early morning brainstorming and feedback sessions, and reminding me that this is a rollercoaster journey of moments of joy, multiple breakdowns and everything in between.

To the special man, my husband, who was my anchor, and my shadow in every step of my thesis. You have supported me in being who I am, took care of me when I was extremely ill, stayed with me at university when I couldn't stay at home, and you have grown from knowing nothing about design (and me), to supporting me in every way you could to ensure I reached the finish line. Words cannot express my gratitude for your invaluable encouragement, stomach-aching laughter, dedication, understanding and reassurance in trying times. It is true, when my colleagues say that you deserve to be granted a degree too.
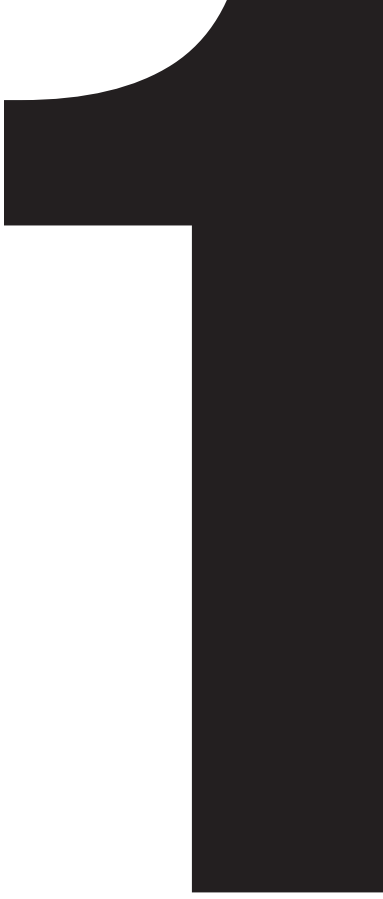
Finally, I am eternally grateful to my parents for their foundational support in ensuring my safety, and making sure I always had enough food even when I didn't need it. To my siblings, for always sharing your first-hand experience and helping me understand the Qur'an memorization process in practice, and beyond.

To everyone else who have made even the slightest contribution- you did make a difference. I am ever grateful.

table of index

abstract

1

The rise of digital technology has transformed nearly every part of our daily lives, including the way we learn and memorize. Such transformations raise interesting questions for one of the most long-standing and demanding memorization tasks in the world: the memorization of the Islamic holy book, The Qur'an. For Muslims, The Qur'an is a timeless, sacred text, cradling within its covers many profound images, stories, and parables. Despite rigorous research in the fields of game design and memorization techniques, very little work has been done in combining these two areas of research to create a game-based memorization experience of The Quran. This thesis synthesizes game design elements with existing memorization techniques to foster a more engaging, enriching, and inspiring Qur'an memorization experience.

KEYWORDS

2

introduction

Since childhood, I was accustomed to memorizing parts of the Qur'an on my own as I was the only one amongst my siblings who did not go to a memorization center.

In 2012, my Fashion Design internship in New York followed an unanticipated turn when my friend and fellow classmate informed me of a one-month Ramadan intensive course covering tafseer (exegesis) of a few surahs (chapters) of the Qur'an at Bayyinah Institute, located in Dallas, Texas. This immersive experience changed my entire relationship with the Qur'an by introducing me to a holistic understanding and reflection of the interactive nature of the Qur'an.

Coming back to Doha, as I utilized the online videos of tafseer of the verses that I was memorizing to strengthen my link with the Qur'an, I began questioning the memorization process that was taught to my siblings at the Qur'an memorization centers. It was a monotonous process of rote memorization, and their relationship with the Qur'an was superficial because of the lack of connection with the verses they were memorizing. It is easy to memorize, but it is not enriching and meaningful. The long videos, or even short ones seemed to not grab their interest due to their length. My younger brother, who was eight years old, would rush to complete the verses prescribed by his teacher so he could indulge in games for the remainder of the day. I wondered if these two activities could be merged together to create an experience that was meaningful to his interests in games and play.

As I enrolled myself in the MFA program, I found I had less time each day to spend on Qur'an memorization. Asking around casually, I found out that the majority of my colleagues, students and friends, as well as friends from outside the university were facing a similar challenge. As I moved away from my circle and interviewed a teacher from a memorization center, I found that it was a phenomenon in most of our lives, regardless of time. She was concerned about the lack of resources which resonated with the new generation, and her inability to share innovative learning resources with the parents of her students. She also explained that her children were memorizing and recollecting at alarmingly different rates despite being quick learners. Her elder son smoothly memorized with the traditional methods, while her younger daughter failed to retain the verses memorized, despite numerous efforts.

My own husband cringed at the idea of memorizing anything. I realized this was not due to his inability, but rather his lack of motivation, due to the mundane process of mere repetition.

So I decided to experiment with him one day. I chose Surah Al-Duha, the 93rd Chapter from the Qur'an. We had an engaging session where I explained the story of the Prophet Mohammed peace and blessing be upon him (PBUH) in the context of the revelation and he was able to put himself in the shoes of the Prophet. The interactive process I used made him appreciate the warmth and reassurance in God's words, which in turn strengthened his love for the Qur'an. He was able to learn the meaning of each word swiftly. On being quizzed on the Surah, he could understand the entire Surah and memorized it in the same sitting. It was more fascinating for him than it was for me. He expressed that he had never experienced the Qur'an this way. This was a turning point for him, but also a memorable moment for us.

These reflections were the initiation of the many inquiries to uncover tools that could make the memorization process more meaningful and engaging for the new generation of learners.

How can we foster a love of the Qur'an for generations who grew up in the digital era, by making the process of memorization less monotonous and more pleasurable, while preserving the value of the Qur'an and building upon existing memorization methods?

3

justification

The need for change in the instruction of the method of memorization of the Qur'an is no longer a discussion of if, but of how. Bilal Menon, the creator of Qur'an Companion, a Qur'an memorization app, justifies the need for integrating digital technology with traditional memorization methods by sharing his story of memorization of the Qur'an. By the age of eleven, Menon had memorized the entire Qur'an, but as a teenager, he forgot it completely. As a university student, he began a new journey with the Qur'an, and revived his link with the Qur'an. Although learning in a memorization center is a great approach for accountability, perfecting recitation, etc, there is a need for a more holistic approach for today's generation of children, to see that the Qur'an is a source of spiritual nourishment, instead of punishment.[1]

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[1] ImanWire & Mohammed Saleem, "Using Technology to Make Qur'anic Memorization Easier: Bilal Memon | ImanWire," Al-Madina Institute, May 13, 2016, http://almadinainstitute.org/blog/making-quran-memorization-easier-through-technology-bilal-memon/.

The transformations in the field of technologies have congregated our daily life routines under a single touch and Muslims are also adopting these new tools with an exponential growth.[2] Extending this notion to Qur'anic studies, Muslims are shifting to electronic or smart devices to learn their religious books. Numerous attempts have been made to digitalize the learning of the Qur'an, as well its memorization.[3] Reports indicate that many people today struggle with their abilities to maintain attention and to retain or memorize information– not because they cannot, rather due to the methods of teaching.[4] This issue is becoming particularly relevant within the most recent generational groups now termed with such titles as Generation Z, the Net Generation, or Digital Natives.

Although there are many methods used to ensure the preservation of the Qur'an in the modern age, memorizing the Qur'an is one of the methods to ensure that it remains intact in the hearts of its followers. The motivation to memorize the Qur'an is instilled with a variety of rewards that will be given by God for those who memorize the Quran.[6] It is found through many of the sayings of the Prophet Muhammad (PBUH):

Whoever reads the Qur'an, learns it and acts in accordance with it, on the Day of Resurrection his parents will be given a crown to wear whose light will be like the light of the sun, and his parents will be given garments which far surpass everything to be found in this world. They will say, "Why have we been given this to wear?" It will be said, "Because your child learned the Qur'an."[7]

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[2] Khurram Khan and Yasser Alginahi, "The Holy Quran Digitization: Challenges and Concerns," January 1, 2013.

[3] E. Almosallam et al., "ITQAN: A Mobile Based Assistant for Mastering Quran Memorization," in 2015 Fifth International Conference on E-Learning (econf), 2015, 349–52, https://doi.org/10.1109/ECONF.2015.42.

[4] Marc Prensky, "Digital Natives, Digital Immigrants Part 1," On the Horizon 9, no. 5 (2001): 1–6, https://doi.org/10.1108/10748120110424816.

[5] Prensky.

[6] Sedek Ariffin et al., "Effective Techniques of Memorizing the Quran: A Study at Madrasah Tahfiz Al-Quran, Terengganu, Malaysia" 13 (January 1, 2013): 45–48, https://doi.org/10.5829/idosi.mejsr.2013.13.1.1762.

[7] "Reward for Memorizing Qur'aan - Islamqa.info," accessed October 30, 2017, https://islamqa.info/en/20803.

Studies in the world of game-based learning as well as Qur'an memorization prove that today's students learn differently than previous generations.[8] The current traditional methods in Qur'an memorization centers are becoming less effective for younger generations. Mark Prensky, father of game-based learning and author of many books, including "Don't Bother me Mom, I'm Learning!" states that we can either choose to ignore our eyes, ears, and intuition, and pretend that traditional methods are enough, or we can choose to accept the fact that this shift in learning exists and continue to effectively communicate valuable knowledge and wisdom to the next generation by creatively examining how they learn. Prensky states that the biggest problem in education today is that our instructors from the pre-digital age (digital immigrants) are struggling to teach a population that were born into the digital era and speak the digital language (digital natives).[9]

While one could argue that there are a vast number of mobile and web-based apps for memorization of the Qur'an, research has shown that these applications are, "...still limited and focused on the direct use of technology such as storing, listening, searching, etc. without using more useful and creative techniques to help Qur'an memorizers to interact with the Qur'an."[10] This correlates with my own analysis, detailed later in the thesis. As stated by Prensky, "The cognitive differences of the Digital Natives cry out for new approaches to education with a better 'fit'."[11]

This research seeks to address this challenging problem in the design and creation of game-based learning tools for memorizers of the Qur'an. This will, in turn, provide multiple opportunities to rethink tools and methodologies for the process of memorizing the Qur'an.

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[8] "A Framework for Designing Mobile Quranic Memorization Tool Using Multimedia Interactive Learning Method for Children (PDF Download Available)," accessed September 3, 2017,
https://www.researchgate.net/publication/309529559_A_framework_for_designing_mobile_quranic_memorization_tool_using_multimedia_interactive_learning_method_for_children.
[9] Prensky, "Digital Natives, Digital Immigrants Part 1."
[10] Almosallam et al., "ITQAN."
[11] Prensky, "Digital Natives, Digital Immigrants Part 1."

4

delimitations

This research is an opportunity to provide a template, or a process through which the topic of game-based learning of the Qur'an can be explored and result in critical, innovative, and engaging outcomes. The target audience for this research will be digital natives and digital immigrants living in the digital era. The life of digital natives is fast-paced, with a lot of stimulation. Digital natives browse through their mobile devices at high speed, and they have low motivation to memorize the Qur'an through traditional methods, having become accustomed to the speed and allure of digital media. Various questions are explored through designed outcomes, varying in medium, process, methodology, and use. Developing a single tool that works perfectly is beyond the scope of this research, as the development of solutions of this caliber in the area of Qur'anic memorization is fairly young. This thesis looks at this as a positive challenge, to create a point of departure, and to inspire further research and collaboration by asking critical questions.

background

5

This section introduces game design elements and memorization techniques, two areas that form the foundation of this research. The critical questions and design processes are derived by synthesizing these two areas to form the base of the thesis framework. The framework is superimposed with the characteristics of the learners of the digital era, also known as digital natives. Hence, it is worthwhile to first understand who they are before we can effectively design for them.

DIGITAL NATIVES, DIGITAL IMMIGRANTS

native

noun

a person born in a specified place or associated with a place by birth, whether subsequently resident there or not.

immigrant

noun

a person who comes to live permanently in a foreign country.

Marc Prensky distinguishes the current generation from previous ones through the categories of digital natives and digital immigrants, respectively.[12]

Digital natives are native speakers of the digital language of computers, video games and the internet. Others, born earlier, have adapted to the digital era, and are called digital immigrants. Like all immigrants, some learn to adapt better than others, to some degree retaining our accent, one foot in the past. Prensky's favorite example of a digital immigrant accent is the, "Did you get my email?" phone call. While this may seem humorous, Prensky points out that it is not a joke. A large number of instructors today are digital immigrants who possess a digital immigrant accent. Digital natives think and function differently. Prensky does not shy away from identifying this as the biggest problem facing education today.

Our Digital Immigrant instructors, who speak the language of the pre-digital age, are struggling to teach a population that speaks an entirely new language.[13] Presnky states that students have not just changed incrementally, like generations in the past changed in relation to their ancestors; rather, today's generations are experiencing an immense discontinuity, a singularity that changes things fundamentally. This singularity is the arrival and rapid dissemination of digital technology in the last decades of the twentieth century. Today's students think and process information fundamentally differently from their predecessors. Digital Natives expect quick delivery of information, graphics before text, and easy links to supplemental or related information (such as hypertext). They like to multitask and process many bits of information at once. They function best when networked, and thrive on instant gratification and frequent rewards. They prefer games to serious work. I see this in my own family; my mother asks my brother to study and can not understand how he can say he is done after just five minutes. As someone in the generation between them, I empathize with both; they speak completely different languages.

Digital Immigrants tend to teach slowly, step-by step, one thing at a time, individually, and above all, seriously, as this is how they have learned. They think that learning can't (or shouldn't) be fun. On the contrary, digital natives have little patience for lectures, and step-by-step, logic-based instruction. Prensky explains that digital immigrant teachers assume that learners are the same as they have always been, and the same methods that worked for the teachers when they were students will work for their students. However, this approach is no longer valid. Students have changed radically. Today's students are no longer the people our educational system was designed to teach.[14] Digital immigrants complain that digital natives have the attention span of a gnat. But as Dr. Edward Westhead, retired Professor of the University of Massachusetts, remarks, "Sure they have short attention spans– for the old ways of learning." Their attention spans are not short for games, for example, or for anything else that genuinely interests them.[15]

As a result of their experiences with technology, digital natives crave interactivity– an immediate response to their each and every action.[16] Digital natives who are accustomed to the twitch-speed, multitasking, random access, graphics-first, active, connected, fun, fantasy, quick-payoff world of their video games, MTV, and the internet, are bored by most of today's education methods, well-meaning as they may be. One of the very few structures capable of addressing the changing learning needs and requirements of digital natives is the very video and computer games they so enjoy. Hence, the emergence and widespread acceptance of game-based learning. Prensky states, "We need to invent Digital Native methodologies for all subjects, at all levels, using our students to guide us." This calls for leaps of reform in the educational methods of any subject, but especially for Qur'an memorization, if we hope our future generations to have a meaningful link with it.

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[12] Prensky, "Digital Natives, Digital Immigrants Part 1."

[13] Prensky.

[14] Prensky.

[15] Marc Prensky, "Digital Natives, Digital Immigrants Part 2: Do They Really Think Differently?," On the Horizon 9, no. 6 (2001): 1–6, https://doi.org/10.1108/10748120110424843.

[16] Prensky.

GAME DESIGN

GAME DESIGN ELEMENTS

MDA, or Mechanics, Dynamics and Aesthetics, developed by Huniche, et al., is a formal approach to understanding games by attempting to bridge the gap between game design and development, game criticism and technical game research. They believe that this methodology will simplify and strengthen the iterative process used by developers, scholars, and researchers, allowing all parties to decompose, study and design a broad class of game designs and game artifacts.[17] Robson and team utilize the same framework but modify MDA to MDE (Mechanics, Dynamics and Emotions) for their application. For the purposes of this thesis, Hunicke et al.'s model will be followed as the latter presents game design elements in a crude form, whereas Robson and team's model is modified for its application in gamification. Gamification is the use of game design elements within non-game contexts.[18] This definition, as well as the MDE model, works best for real-world contexts and is used to foster human motivation and performance with regard to a certain activity. It does not, however, have learning outcomes. Hence Hunicke et al's framework is used in this research as it is in its true form and can be modified for designing a game-based learning tool for memorizing the Qur'an.

However, Robson and team's research better explains this framework, and hence both are referenced in this research for fulfilling different purposes. The MDA model is used to guide the research framework, while MDE model is used to provide more variety of examples.

As Prensky warns: "The trick, though, is to make the learning games compelling enough to actually be used in their place. They must be real games, not just drills with eye candy, combined creatively with real content." Thus, the direction of this thesis is to design a game/ game system which will be informed by the MDA framework.
Created by designers and teams of developers, players are the consumers of games.

Designer > Game < Player

According to Hunicke and team, what differentiates games from other entertainment products such as books, music, movies and plays, is that their consumption/ use is relatively unpredictable. The string of events that occur during gameplay and the outcome of those events are unknown at the time the product is finished.[19]

As per the MDA framework, the formal consumption of games is broken down into distinct components:

Rules > System > Fun

And establishes their design counterparts:

Mechanics >   Dynamics > Aesthetics

These components will be discussed below in detail as they inform the design process and outcome of this project.

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[17] "MDA, A Formal Approach to Game Design and Game Research | Game Design | Technology," Scribd, accessed August 28, 2017, https://www.scribd.com/document/95372104/MDA-A-Formal-Approach-to-Game-Design-and-Game-Research.

[18] as cited in Michael Sailer et al., "How Gamification Motivates: An Experimental Study of the Effects of Specific Game Design Elements on Psychological Need Satisfaction," Computers in Human Behavior 69, no. Supplement C (April 1, 2017): 371–80, https://doi.org/10.1016/j.chb.2016.12.033.

[19] "MDA, A Formal Approach to Game Design and Game Research | Game Design | Technology."

GAME
MECHANICS

Mechanics are the particular components of the game, at the level of data representation and algorithms. They are the decisions that designers make to specify the goals, rules, settings, context, types of interaction (i.e. opponents), and boundaries of the game. These remain constant; they do not change from one player to the next and stay the same each time a player engages in the experience. For example, in the game of chess, the mechanics include decisions that determine the number of pieces, the number and pattern of squares on the board, and how a winner is decided. There are three different types of game mechanics that are vital for a game: setup mechanics, rule mechanics, and progression mechanics.

Set up mechanics shape the environment of the experience, including the setting, what objects are needed, and how the objects are distributed among the players. For example, setup mechanics determine who a player is playing against: Is the competitor known or unknown, internal or external, a single competitor or a group? These decisions impact the overall context of the game experience. Designers must consider spatial dimensions to determine where in the real or virtual world the experience will take place, and temporal dimensions– whether it is real time or turn based, or whether it has a finite end or infinite play.[20] These are all essential elements to understand in order to have more clarity in the design process, which will, in turn, strengthen the outcome.

[20] Robson et al.
[21] Robson et al.

Rule Mechanics can be topological, and specify what happens when a player lands on a specific real or virtual spot. Time-based rule mechanics specify whether players have to act within a time period, or how resources build up or deplete over time. Objective-based rule mechanics specify effects of a specific circumstance being met, for example, completion of one level unlocking the next.[21]

Progression mechanics describe different types of instruments that designers embed to affect the experience as it happens. To signal progress, achievement rewards are often used. These could be virtual victory point systems that players accumulate as they progress– such as scores, levels progress boards, or resources (such as strength), but can also be real rewards (e.g. currency). Achievement rewards with social significance such as badges, trophies, and leaderboards indicate the social standing within a community and are powerful progression mechanics. Progression mechanics lend important feedback that signal a player's success toward victory. It must be noted that the achievement rewards must be desirable for the players; otherwise, the experience loses its value. Also important to consider is that having too many rewards– especially top rewards– can dilute the overall strength of rewards and the meaningfulness of status levels and victory.

Game mechanics, thus, are essential aspects of game design: they determine who the key parties are, how they interact, how to win or lose, and where and when the experience takes place. Mechanics form the structure in which the game experience exists. However, on their own, they aren't enough to create an experience that will motivate players.[22]

[22] Robson et al.

GAME
DYNAMICS

Dynamics are a form of narrative generated by the interaction of player inputs with the game mechanics over time.[23] In other words, game dynamics are the types of player behavior that emerge as players partake in the experience. Unlike game mechanics, which are set by the designer, the dynamics are produced by how players follow the mechanics chosen by the designers. These dynamics describe in-game behaviors and the strategic actions and interactions that emerge during play.[24] In the game context, the mechanics of the multiplayer card game Poker include shuffling, trick-taking, and betting, from which various dynamics such as bluffing, cheating, conspiring, and bragging can emerge. Mechanics such as team-based player structures can lead to dynamics such as cooperation, while an individual player structure may lend itself to a more competitive dynamic.

Dynamics are difficult to predict and thus can lead to unintended behaviors and outcomes that can be positive or negative in nature. The designer's challenge is to anticipate the types of dynamics than can emerge and meticulously develop the mechanics of the game.[25]

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[23] "MDA, A Formal Approach to Game Design and Game Research | Game Design | Technology."
[24] Robson et al., "Is It All a Game?"
[25] Robson et al.

GAME
AESTHETICS

Aesthetics are desirable emotional responses evoked in players when they interact with the game system. While describing the aesthetics of a game, we want to move away from words like fun toward a more directed vocabulary. A taxonomy is listed below:[26]

1. Sensation: Game as sense-pleasure
2. Fantasy: Game as make-believe
3. Narrative: Game as drama
4. Challenge: Game as obstacle course
5. Fellowship: Game as social framework
6. Discovery: Game as uncharted territory
7. Expression: Game as self-discovery
8. Submission: Game as pastime

These terms are illustrated by considering the games: Charades, Quake, The Sims, and Final Fantasy. While each are fun in their own right, it is much more informative to consider the aesthetic components that create their respective player experiences:

Charades: Fellowship, Expression, Challenge
Quake: Challenge, Sensation, Competition, Fantasy
The Sims: Discovery, Fantasy, Expression, Narrative
Final Fantasy: Fantasy, Narrative, Expression, Discovery, Challenge, Submission

Observe that each game pursues multiple aesthetic goals to varying degrees. Charades emphasizes fellowship over challenge; Quake provides challenge as a main element of gameplay. And while there is no grand unified theory of games, and no formula that details the combination and proportion of elements that will result in fun, this taxonomy helps us more precisely describe and understand games, shedding light on how and why different games appeal to different players, or to the same players at different times.

It is essential to provide clear feedback on who is winning in competitive games. Players lose interest in a game if they are unable to see a clear winning condition, or if they feel winning is unlikely.[27]

It is fundamental to note that the MDA framework treats games as artifacts rather than media, which means that the content of a game is its behavior, not the media that streams out of it towards the player. Thinking about games as designed artifacts helps frame them as systems that build behavior through interaction. It supports clearer design choices and analysis at all levels of study and implementation.[28]

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[26] "MDA, A Formal Approach to Game Design and Game Research | Game Design | Technology."
[27] "MDA, A Formal Approach to Game Design and Game Research | Game Design | Technology."
[28] "MDA, A Formal Approach to Game Design and Game Research | Game Design | Technology."

OPERATION OF
THE MDA MODEL

Each component of the MDA model can be considered as a "lens" or a "view" of the game; separate, but causally linked.[29]

To summarize, aesthetics help us describe gameplay dynamics and mechanics. Mechanics allow game dynamics to exist, and dynamics result from user interaction.

Simple changes in the aesthetic requirements of a game will introduce mechanical changes on many levels--sometimes the development of entirely new systems for navigation, reasoning, and strategic problem solving. Following the MDA framework allows game creators to reason explicitly about aesthetic goals, draw out dynamics that support those goals, and then scope the range of mechanics accordingly.

[29] "MDA, A Formal Approach to Game Design and Game Research | Game Design | Technology."

Applying these arguments and game elements to the existing apps of Qur'an memorization, there occurs so far, no functioning tool that can be evaluated under this model, which will be discussed later in this document. Hence, this research proposes a starting point for reforming the way we approach memorization of the Qur'an for the digital natives. Game-based design elements will be utilized to inform the mechanics and aesthetics of the design outcome through an iterative design process.

QUR'AN

Before delving into existing methods of Qur'an memo-
rization, it is worthwhile to understand the Qur'an.

THE QUR'AN

The Qur'an is the fundamental holy book of Islam.[30] The Qur'an is the word of Allah (God) brought to the Prophet Muhammad, peace and blessings be upon him (PBUH), by the Angel Gabriel, PBUH, in segments over a period of 23 years.

The wisdom of revealing the Qur'an in segments teaches us an important method to employ to the problem of memorization, a key principle of this thesis. Revealing the Qur'an in segments, instead of all at once, allowed the prophet Muhammad (PBUH) to relate verses appropriate to the events and context in which they occurred.

There are 114 surahs (or chapters) in the Qur'an, divided into 30 parts for ease of reference and recitation. Each surah is a different length, consisting of varying numbers of verses, the longest having 286 verses, the shortest having 3 verses. The verses also range in length from a few letters (fig.00n) to a paragraph (fig.00n) (consisting of 128 words and 540 letters). All the 114 surahs are categorized into Makki Surahs (revealed in Makkah) or Madani Surahs (revealed in Medina) based on the periods of the Prophet's life.

Reflection on the revelation of the Qur'an also reveals many parallels to game design principles, and techniques for designing for digital natives. The Makki Surahs were revealed in the early days of Islam and early in the Prophet's life. The verses are short, they contain fast rhythms, and they contain strong visual imagery. One reason the verses were short was to grab people's attention. By contrast, the longer verses of Madani Surahs were revealed to an audience who were already motivated and highly engaged in the practice of Islam. This wisdom can be utilized in the game mechanics to make the learning easier, simpler, and shorter for beginners, while progressing in difficulty as the learner levels up.

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[30] "A Framework for Designing Mobile Quranic Memorization Tool Using Multimedia Interactive Learning Method for Children (PDF Download Available)," accessed July 15, 2017, https://www.researchgate.net/publication/309529559_A_framework_for_designing_mobile_quranic_memorization_tool_using_ multimedia_interactive_learning_method_for_children.

METHODS OF MEMORIZATION

There is no magic trick to memorizing the Qur'an--or any other text for that matter. Memorization requires great interest, passion, prioritization, persistence, and discipline.[31]

In memorization, it is a simple formula--the 3R's: Registration, Repetition, Recall.[32] Similar is the process of Qur'an memorization. However, the terms used can differ from culture to culture. For example, the students first read the new lesson, either with the help of a teacher or a recorded recitation of some famous Qari (reciter of The Qur'an) before memorizing it. The final stage is recalling the memorization. Subsequent recalling can be termed as muraja'a (revision).[33]

Nishant Kasibhatla, author of the book, "STTS: Maximize Your Memory Power," argues that if you are to register information effectively, it is important to use the right techniques. People often are unable to recall certain information due to improper registration.[34] People who take shortcuts short-change registration, and often face challenges recalling information properly later. Fast Fact: 95 percent of all memory problems are problems of registration. Some memorization techniques apply to equally well to the taks of Qur'an memorization. These techniques inform this research and will be defined below.

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[31] Baba Salam, "Book: How to Memorize the Qur'an in 10 Years, Regardless of Age and Profession," GSalam.Net (blog), August 12, 2012, http://www.gsalam.net/book-how-to-memorize-the-quran-in-10-years-regardless-of-age-and-profession/.

[32] Nishant Kasibhatla, "The 3 R's of Memory Process," in STTS: Maximise Your Memory Power (Marshall Cavendish International (Asia), 2010), http://proquest.safaribooksonline.com.proxy.library.vcu.edu/book/personal-development/9789814312462/firstchapter.

[33] "Traditional and Modern Methods Used for Memorization of Quran in Turkey – MAARIF RESEARCH JOURNAL," accessed November 29, 2017, http://mrjpk.com/memorization-of-quran-in-turkey/.

[34] Kasibhatla, "The 3 R's of Memory Process," 3.

Association is a key principle in almost all memory techniques. Association means, to connect one thing to another. In the context of memory, association means linking one thing you want to remember to something you already remember.[35] Following are three association techniques that will be utilized in this research.

METHOD OF LOCI (MOL)

An ancient mnemonic strategy used to enhance serial recall. Traditionally, MOL is carried out by imagining navigating a familiar environment--a memory palace--and placing to-be-remembered items in specific locations. For retrieval, the individual re-imagines walking through the environment, looking for those items in order.[36] The MOL technique has been traditionally used as a method for remembering speeches and lists of items, when the order is important. In the context of Qur'an memorization, order is key, and hence this method serves as an effective tool.

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[35] Kasibhatla, 3.

[36] Eric L. G. Legge et al., "Building a Memory Palace in Minutes: Equivalent Memory Performance Using Virtual versus Conventional Environments with the Method of Loci," Acta Psychologica 141, no. 3 (2012): 380–90, https://doi.org/10.1016/j.actpsy.2012.09.002.

SPACED REPETITION

As the name suggests, this is a method used to repeat information at a set interval, increasing the efficiency of memory creation for a longer period of time, and ensuring that knowledge is retained.[37] This method is used consolidate information already learned. Hundreds of studies in cognitive and educational psychology have demonstrated that spacing out repeated encounters with the material over time produces superior long-term retention, compared with repetitions that are massed together.[38]

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[37] "Traditional and Modern Methods Used for Memorization of Quran in Turkey – MAARIF RESEARCH JOURNAL."

[38] Susan T. Fiske and Sean H. K. Kang, "Spaced Repetition Promotes Efficient and Effective Learning: Policy Implications for Instruction," Policy Insights from the Behavioral and Brain Sciences 3, no. 1 (March 1, 2016): 12–19, https://doi.org/10.1177/2372732215624708.

CHUNKING

The method of breaking down information into smaller meaningful parts. Chunking can be used to break down verses for the purposes of memorization. This method is used to reduce the cognitive load on a learner in processing information, and to improve working memory performance.[39] While this is a method of memorization, it can also be used as a method of recollection.

The three methods that will be integrated into the design process for the development of the final outcome will be Method of Loci, Spaced Repetition, and Chunking. These methods of memorization will be combined with game mechanics to enhance the memorization experience in order to offer digital natives a number of tools to utilize throughout the process of Qu'ran memorization.

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[39] "A Framework for Designing Mobile Quranic Memorization Tool Using Multimedia Interactive Learning Method for Children (PDF Download Available)."

6

precedents

There exists very little work in the field of game-based learning tools for Qur'an memorization. In this section, I position my work relative to recent works that are linked to my research tangentially, extracting separate lessons from each. The following precedents provided important insight during the development of my thesis:

LOGIFACES

LOGIFACES is a set of 16 hand-poured concrete prisms, each with different top angles. The only rule of this game is to create a form by placing the prisms next to each other to form a continuous surface. This allows the game to be played by people of all ages, as long as a continuous surface is made across all pieces.[40] This puzzle can be played by single players or in groups, thus allowing users to have fun on their own or with others. It is unique, and players are instantly drawn to it. Combining computer graphics, 3D modeling technologies and ancient puzzle techniques (creating them out of molds), this game is definitely an inspiration. LOGIFACES can boost creativity, serve as a tool for meditation, and hone logical thinking skills.

[40] "LOGIFACES: Analogue Game for Digital Minds," Indiegogo, accessed October 18, 2016, http://www.indiegogo.com/projects/993035/fblk.

Fig.1: Prism shapes create a process of building piece-by-piece; a process that can parallel the Qur'an memorization process, where one builds knowledge, verse-by-verse.

SPELLO SOUND MAT

With Spello Sound Mat, toddlers can stomp out words in an interactive game, where feedback can be seen in real time on a screen– either by connecting it to a phone, or to a television.

The mechanics of this mat provide an interesting solution for individuals who learn actively. Spello Sound Mat is an inspiring example, and imagining it re-purposed to meet the needs of the Qur'an memorizers was productive. It offers important lessons by providing clear triggers and feedback–techniques especially effective with digital natives.

Fig. 2: Spello Sound Mat in action.
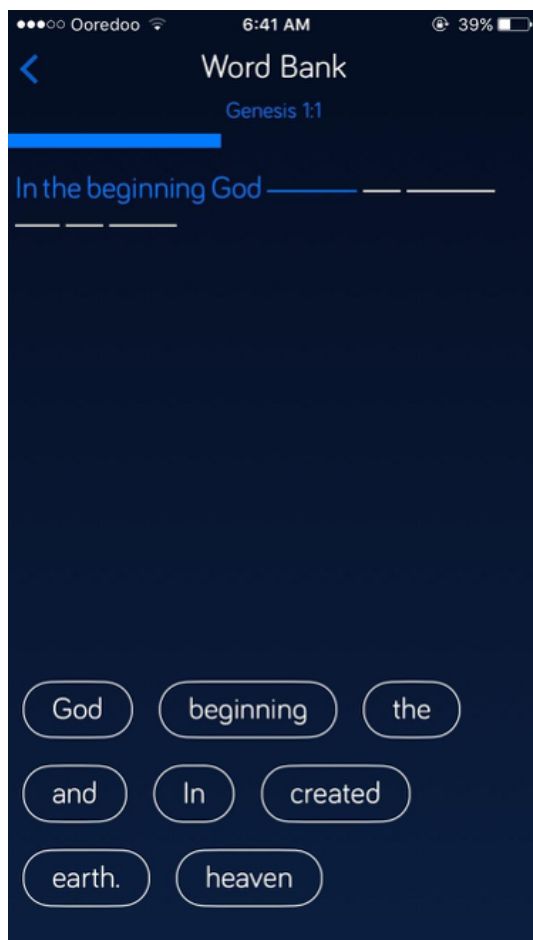
Fig. 3: A screenshot of Word Bank, one of the memory games in Verses.

VERSES

Verses is an app designed to help users memorize Bible verses. It does this by indicating a user's progress, organizing the verses into categories, and providing prompts to aid memorization. However, it is noteworthy to understand that this is a gamified experience of the Bible, and not a game-based learning tool. The use of colors and progress bars make it visually interactive, however, it fails to instill emotions in the learning process. The memory games lack visual continuity with the remainder of the app, such as the well-thought-out arrangement of the chapters and verses as shown in the images below.
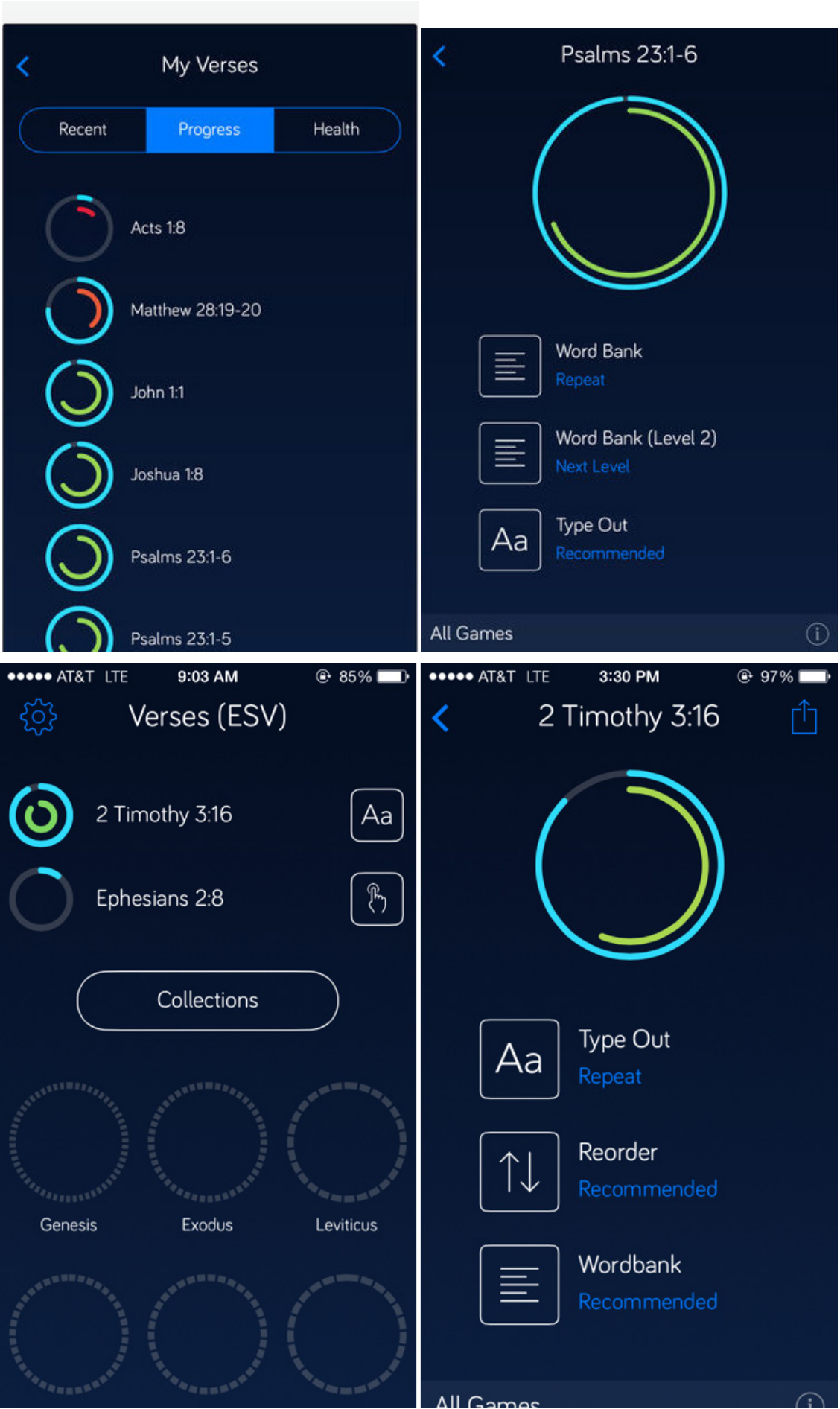
Fig. 4: Verses, screenshots.

MINECRAFT: EDUCATION EDITION

Minecraft: Education Edition is an open-world game that promotes creativity, collaboration, and problem-solving in an immersive environment where the only limit is the player's imagination. Minecraft: Education Edition helps students learn through games, allowing students to immerse in the gaming environment. It also includes game mechanics such as group players, helping build a community of learning through sharing, communicating and collaborating. The game design elements of Minecraft can be applied to the memorization of The Qur'an. Groups and communities can connect and memorize together, instilling competition as well as collaboration, providing feedback and challenges, as well as motivation to level up.

Fig. 5: Minecraft: Education Edition, screenshots.

conceptual framework

Synthesizing the above information, the conceptual framework of this research is based on two major components: game design elements and memorization techniques.

As mentioned earlier, these two fields are superimposed to derive the questions for this thesis- mainly, how can we make the memorization of the Qur'an more engaging, enriching and inspiring? While The Qur'an will be the source of content, the game-based principles and memorization techniques will inform the presentation of this content in the language of Digital Natives.

The above overarching thesis question is explored by using the conceptual framework as a guide. The design process thus follows this framework through iterative experiments and investigations which result in the game-based outcome of this thesis. Following is a visual summary of the entire thesis process.

GAME DESIGN ELEMENTS

RESEARCH **INQUIRY**

MEMORIZATION METHODS

MECHANICS
DYNAMICS
AESTHETICS

CHUNKING
METHOD OF LOCI
SPACED REPETITION

GAME-BASED
MEMORIZATION

ITERATIVE
DESIGN
PROCESS

GAME DESIGN SYSTEM
INTERACTION DESIGN
INTERFACE DESIGN

صل
SIL
GAME-BASED
QUR'AN
MEMORIZATION
TOOL
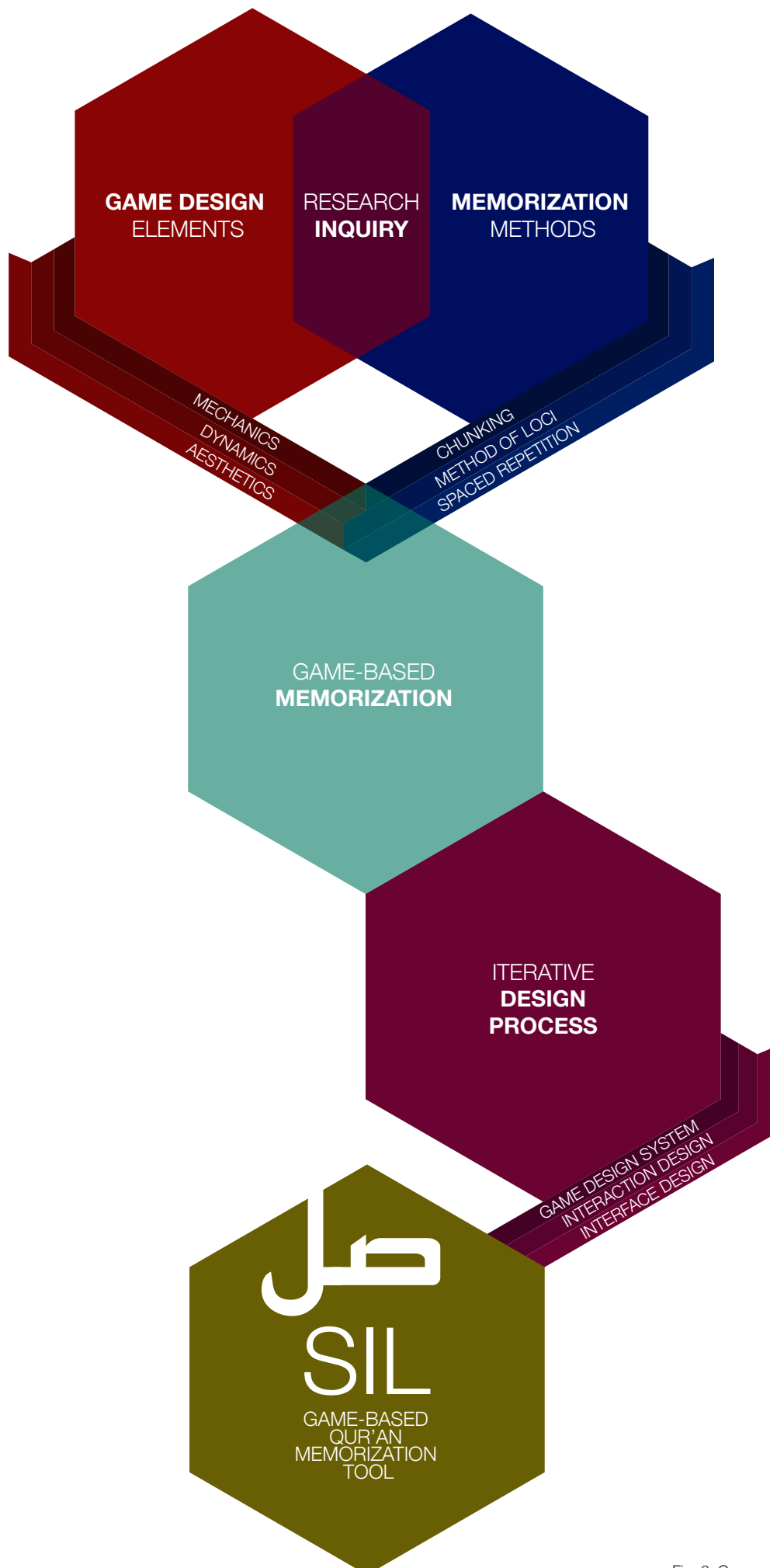
Fig. 6. Conceptual Framework

The various topics are explored by following the thesis question and the conceptual framework. The components of research framework are juxtaposed on the outcomes of the design process, tested pragmatically and feedback of various stakeholders (memorizers of The Qur'an, teachers of Qur'an memorization, feedback from scholar, etc) are taken into consideration to improve the outcomes. The following section is an overview of these experiments throughout the research process.

8

preliminary investigations

DECONSTRUCTION

STRUCTURE OF THE QUR'AN

AIM/ INTENT

- Deconstruct the architecture of the Qur'an to understand the various elements that constitute it.
- Understand the process of deconstruction, and contemplate its deeper meaning. This was essential for me as a designer to derive the essential components that make up the Qur'an

ACTIONS/ PROCESSES

- Lay the visible elements that constitute the Qur'an by following the index (Fig.00n) of the Qu'ran. The index at the end of The Qur'an is used in the crude form.
- Read for further understanding and de-cluttering. Research and reading was carried out to assimilate the 'raw' content, which was later mapped out visually. Reading further was essential to understand the principles of classification of the different segments of the Qur'an so that I could form my own visual system.
- Begin to layout the findings in tangible forms.
- Create a system for the arrangement of the Qur'an that is visually accessible first and have further layers of information to reveal the details. As there didn't exist a compelling visual representation, I had to begin from scratch to undergo various iterations to deduct one that worked best, by giving myself variables and constants in creating a visual system.
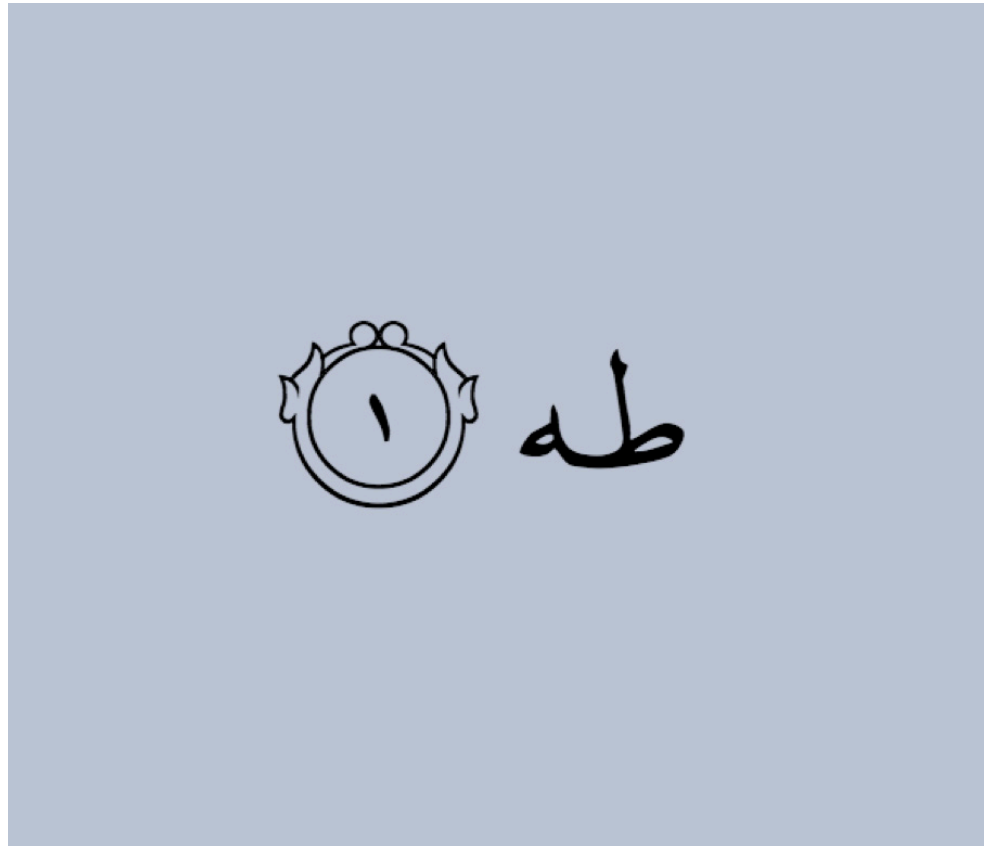

Fig. 7. Index showing all the Surahs of the Qur'an

Fig. 8: Shortest Aya (Qur'anic verse)

يَـٰٓأَيُّهَا ٱلَّذِينَ ءَامَنُوٓاْ إِذَا تَدَايَنتُم بِدَيْنٍ إِلَىٰٓ أَجَلٍ مُّسَمًّى فَٱكْتُبُوهُ ۚ وَلْيَكْتُب بَّيْنَكُمْ كَاتِبٌۢ بِٱلْعَدْلِ ۚ وَلَا يَأْبَ كَاتِبٌ أَن يَكْتُبَ كَمَا عَلَّمَهُ ٱللَّهُ ۚ فَلْيَكْتُبْ وَلْيُمْلِلِ ٱلَّذِى عَلَيْهِ ٱلْحَقُّ وَلْيَتَّقِ ٱللَّهَ رَبَّهُۥ وَلَا يَبْخَسْ مِنْهُ شَيْـًٔا ۚ فَإِن كَانَ ٱلَّذِى عَلَيْهِ ٱلْحَقُّ سَفِيهًا أَوْ ضَعِيفًا أَوْ لَا يَسْتَطِيعُ أَن يُمِلَّ هُوَ فَلْيُمْلِلْ وَلِيُّهُۥ بِٱلْعَدْلِ ۚ وَٱسْتَشْهِدُواْ شَهِيدَيْنِ مِن رِّجَالِكُمْ ۖ فَإِن لَّمْ يَكُونَا رَجُلَيْنِ فَرَجُلٌ وَٱمْرَأَتَانِ مِمَّن تَرْضَوْنَ مِنَ ٱلشُّهَدَآءِ أَن تَضِلَّ إِحْدَىٰهُمَا فَتُذَكِّرَ إِحْدَىٰهُمَا ٱلْأُخْرَىٰ ۚ وَلَا يَأْبَ ٱلشُّهَدَآءُ إِذَا مَا دُعُواْ ۚ وَلَا تَسْـَٔمُوٓاْ أَن تَكْتُبُوهُ صَغِيرًا أَوْ كَبِيرًا إِلَىٰٓ أَجَلِهِۦ ۚ ذَٰلِكُمْ أَقْسَطُ عِندَ ٱللَّهِ وَأَقْوَمُ لِلشَّهَٰدَةِ وَأَدْنَىٰٓ أَلَّا تَرْتَابُوٓاْ ۖ إِلَّآ أَن تَكُونَ تِجَٰرَةً حَاضِرَةً تُدِيرُونَهَا بَيْنَكُمْ فَلَيْسَ عَلَيْكُمْ جُنَاحٌ أَلَّا تَكْتُبُوهَا ۗ وَأَشْهِدُوٓاْ إِذَا تَبَايَعْتُمْ ۚ وَلَا يُضَآرَّ كَاتِبٌ وَلَا شَهِيدٌ ۚ وَإِن تَفْعَلُواْ فَإِنَّهُۥ فُسُوقٌۢ بِكُمْ ۗ وَٱتَّقُواْ ٱللَّهَ ۖ وَيُعَلِّمُكُمُ ٱللَّهُ ۗ وَٱللَّهُ بِكُلِّ شَىْءٍ عَلِيمٌ ﴿٢٨٢﴾

Fig. 9: Longest verse in The Qur'an

OUTCOME:

Deconstruction in my process did not mean 'demolishing' the existing index of the Qur'an that is familiar to everyone who reads it. Rather, it was the process of breaking down the entire arrangement of the Qur'an into its building blocks.

There are 114 Surahs (or Chapters), in The Qur'an, which are categorized into 30 parts for ease of reference and recitation. Each Surah is of different lengths and

consists of varying numbers of verses, the longest having 286 verses, the shortest having 3 verses. The verses also range in length from a few letters (fig.8) to a paragraph (fig.9) (consisting of 128 words and 540 letters). All the 114 Surahs are categorized into Makki Surahs (revealed in Makkah) or Madani Surahs (revealed in Makkah) based on the periods of the Prophet's life.

Following are some of my outcomes:

The outcome of the first exploration was inspired by the arrangement of the neurons and their interconnectedness, or links, known as synapses in the nervous system of the human body. Neurons are nerve cells, which form the building blocks of the nervous system.
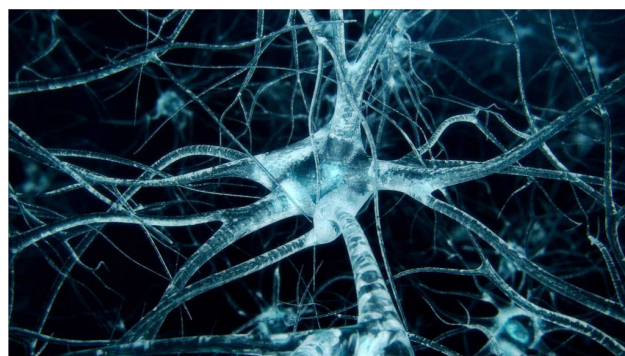

Fig. 10: Neurons

In this exploration surahs are suspended in space (fig. 11), while the links are used to connect them to the Juz (part) that they belong to. First, a layer of the 30 equal circles representing the 30 Juz was created (the purple circles). Next, another layer of circles of different sizes was created (representing the Surahs). Some of these are green, while others are brown. The green represents the Surahs that were revealed in Madina, while the brown represents the Surahs that were revealed in Makkah. The links between the surahs and the Juz are varied to distinguish between the Juz to which they belong. This is not a quantitative representation, rather an impression of the components, as if the actual data is represented. This was because it would take a long time to represent each Surah based on their actual length/ width that they take up in the Qur'an.
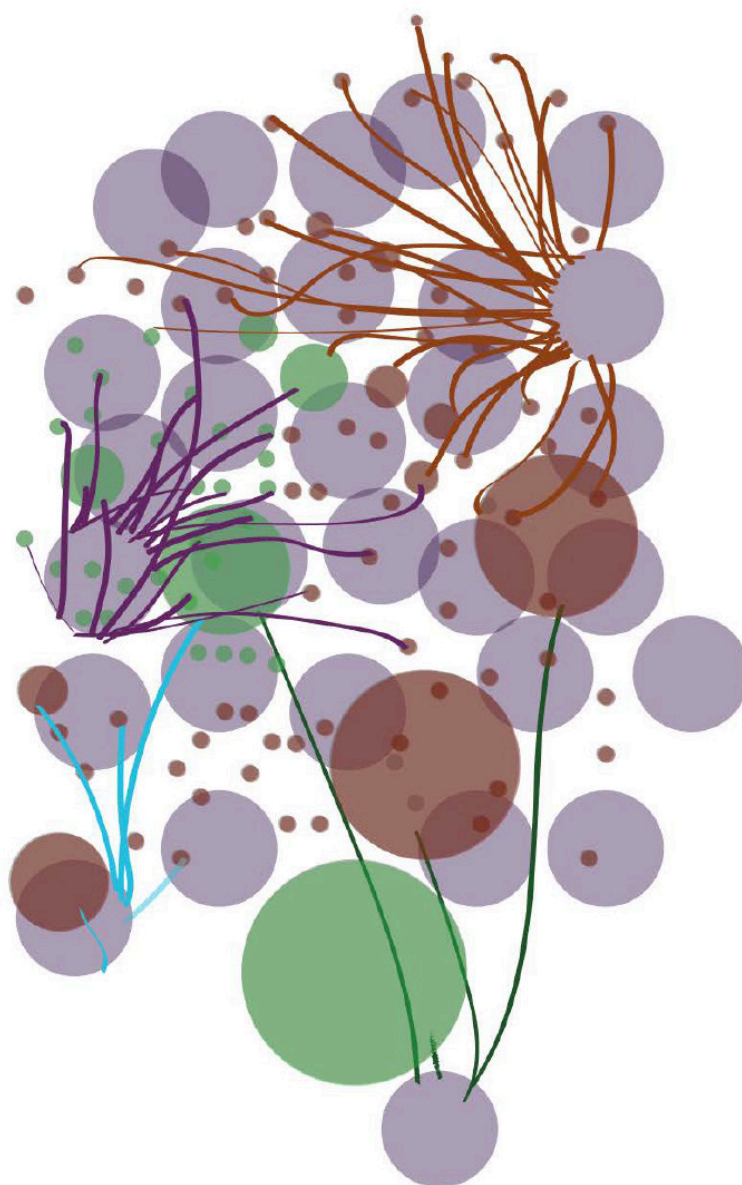

Fig. 11: Outcome 1. (Structure of Qur'an exploration).

OUTCOME 2

In this exploration, the 30 purple circles again represent the 30 Juz. However, they are placed in a linear format, with the first Juz at the bottom and the last Juz on the top. I began to extract the actual relative size of the Surahs (represented in pink). The biggest pink circle represents the largest surah, whereas the next smallest one represents the next, and so on. The overlaps between in the purple circles represent areas of the Qur'an where there is a Surah that has one part of it in one Juz and the other in another Juz. These visual cues laid the foundation steps in my attempt to create a visual structural representation of the Qur'an.
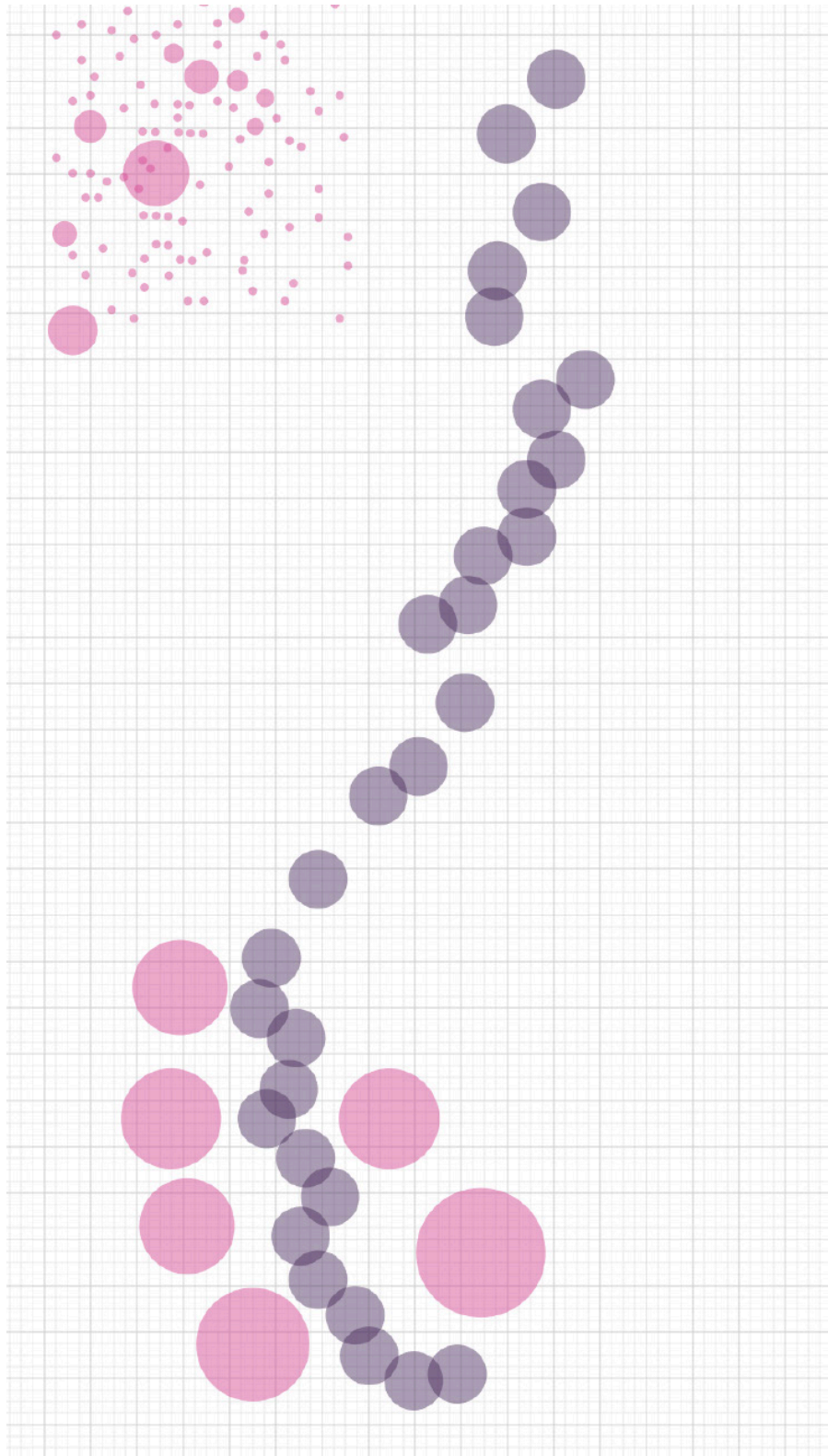
Fig. 12: Outcome 2. (Structure of Qur'an exploration).

EMBEDDING INFORMATION

I began to explore the data in a 3-D format, adding to the layers of information gathered from the above research. Reading further about structure and length of each Surah, I began to embed this information in a way that it could become an interactive memorizing tool. The name of the Surah was embossed on one side of the copper wire with the number of verses on the other side. The length of the wires depended on the length of the Surah (fig.13 and 14).

Fig. 13: Surah number embossed on copper wire.

Fig. 14: Surah number embossed on copper wire.

Another iteration (fig. 15) of embedding information experiment was to create a playful interaction. I created a large cube cushion inspired by dice. Numbers of Surahs were sewn on one face of the cube, while the number of verses were sewn on the opposite face. The cube could be 'rolled' or thrown on the floor to reveal the Surah number, and the participants guess the name of the Surah and the number of verses. These two explorations dealt with the memorization and recollection of the various elements of the structure of the Qur'an, such as Surah number and number of verses in the Surah.

REFLECTION:

For the purposes of simplifying classification, the Aya (Qur'anic verse) is taken as the smallest unit for this research. The shortest Surah has 3 verses, while the longest Surah has 286 verses.

Fig. 15: The process of embedding the information in the creation of the cube.

PLAY T0 MEMORIZE

WORKSHOP

Under this theme there were two explorations, each combining game-based learning principles and memorizing techniques. One was a workshop with a group of 12 freshmen students, while the second experiment included the creation of two puzzle pieces.

AIM

In a week-long exercise with VCUarts Qatar foundation students, I explored principles of game-based learning and memorization techniques. The outcome of the workshop was to transform a story book into a game. Their task was to design a game that helped the player understand the story from a children's book.

PROCESS AND REFLECTION ON OUTCOMES

The students went through the process of game design creation by incorporating game based elements as well as memorization techniques. Creating prototypes and testing them, each had a different approach depending on the content, characters and story of the book that they had chosen. While some games had the win-lose factor, others had the time factor. Some were simple point- based and played by a single player, while others were point based but played by a number of players and had more complex game mechanics.
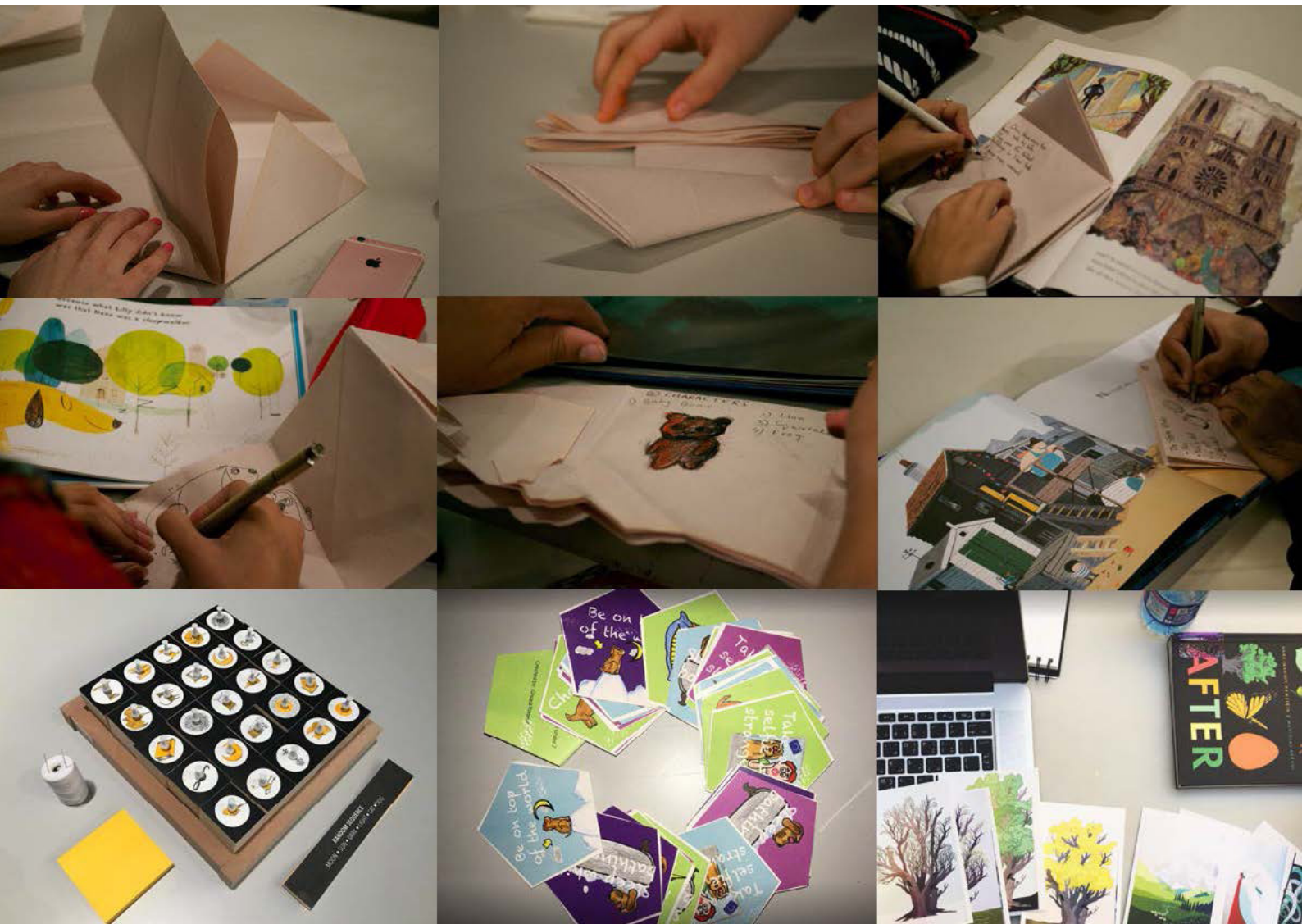

Fig. 16: Processes and outcomes of the workshop

THE PLAY

The final day of the workshop was an evaluation of the games created. What better way to evaluate a game than playing them? By playing each others' games, the participants were able to decipher and remember the story easily due to the incorporation of game-based learning principles. The presentation was filled with fun and learning.

REFLECTION

I was surprised by their ability to create well-functioning games in such a short time while conveying to the rest of us the story. Each game was unique due to their content and the combination of the game it was inspired by. The students successfully created game-based learning outcomes for their chosen books by combining the mechanics and rules of an existing game, and by customizing it and introducing their own variations to the game. This was a valuable methodology in my process to achieve a large number of outcomes in a short period of time, while validating the scope of transforming each Surah/ parts of Surahs into a game-based learning outcome.

Following are two examples of the games created by combining game-based principles and memorizing techniques.

BEFORE, AFTER

This game consisted of a deck of cards inspired by the contents of the book chosen. The student had chosen a book called Before and After, consisting of only images and the transformation of the subjects from one form to another. This game is designed for multiple players. The cards consists of a set of 4 cards belonging to each transformation, and there are many such sets. The players collect a set, by either taking cards from the deck of cards or exchanging cards with other players. The visual cues of the set of each transformation, and simple gameplay reinforce each other facilitate learning and memory, while making the process an engaging one.

Fig. 17: Design Outcome for the book: Before, After

THE HOUSE IN THE NIGHT

In the second example (fig. 18), the student followed the narrative of the story she had chosen (fig. 00n), to create a game that has a similar narrative. The game consists of the different contents to be memorized as shuffled pieces contained on a base. This is an engaging game through clever design in which players follow the instructions given in a card and replay the story's narrative sequence in an interactive way. This game is a tool to help gauge and reinforce reading comprehension of the story.

Both above examples were fun, engaging, and meaningful games to play. Upon user-testing, both games successfully helped to convey the message while incorporating memorizing techniques to aid in learning and memorization.

RANDOM SEQUENCE
MOON • SUN • DARK • LIGHT • CAT • DOG

THE HOUSE IN THE BOX

THE AIM OF THE GAME IS TO MEMORIZE A SEQUENCE AND BE ABLE TO QUICKLY APPLY IT ONTO THE BOARD. DO YOU THINK YOU CAN DO IT? *GIVE IT A GO!*

INSTRUCTIONS:
1. First, you have one minute to look at the sequence. (If you choose to go for the original sequence, you are permitted two minutes instead.)
2. Second, you need to apply this sequence on the board. You will be connecting them by tying only ONE to TWO LOOPS around the pins. If you make a mistake you are out!
3. Third, after completing the sequence, you can take out the cubes and rearrange them.
4. Fourth, just keep playing.

Fig. 18. The designed outcome.

PUZZLE

Employing game principles and inspired by the classic 1980s tile puzzle (fig.19) with a missing piece, I tested the feasibility of the puzzle mechanics with the contents of the Qur'an.

Fig. 19: Classic 1980s tile puzzle.

As the user puts the puzzle together, he/she is on a mission to put the words back together. In doing so, they have to revise it a lot, as the pieces have to be continuously and collaboratively moved to get them to the right places. While testing this on 6 participants (Professor and peers), I was able to get an idea of the game dynamics as the players interacted with the piece. The ones who didn't know the Surah helped the others, and a few minutes into the play, they didn't give up despite the frustration. The motivation to finish it and get the pieces back to their places was exemplary. I was also able to get feedback on what elements worked and what needed improvement. Fig. 20 through fig. 21 shows the process of making the puzzle. Fig. 22 captures the puzzle at play.

In another opportunity, I was invited to present my thesis at the Qatar Faculty of Islamic Studies. Although a small class of about 3 students and one Professor, it was my first time presenting to a Muslim and non-design audience. This was a great opportunity to defend my ideas, but also to get constructive feedback from prospective users of my project. . One of the sentiments shared was that it is disrespectful to have words of a certain verse shuffled as it would change the meaning. Although the whole challenge was to put them together, I took their feedback positively. Asking a scholar (Sheikh Sajid Omar) of the issue, he had a better idea- each puzzle tile could contain one verse instead of one word. This was an excellent proposition.

Fig. 20: Test cuts and final puzzle tiles engraved with one word per tile.

Fig. 21: Laser cut puzzle tiles glued together using acetone.

Fig. 22: Puzzle at play.

Further, another iteration of the previous puzzle was created (Fig. 23) to help an individual or a group of individuals to memorize some of the names of the chapters of the Qur'an, their meanings in English, as well as their sequential numbers of their placement in the text.

This was exhibited at twice (during Tasmeem Design Conference 2016 held at VCUArts Qatar, and at Calligraphies in Conversation Exhibition 2017 held at the Skylight Gallery of the San Francisco Public Library, which allowed for public interaction and feedback. The approach to employing engaging methods to memorizing contents of the Qur'an was appreciated not only by students, but also students in the field of Islamic Studies, and further critical questions were asked. A lot of audience expressed their zeal for further outcomes.

The players arrange the shuffled words to form the Surah. In doing so, they have to revise it a lot, as the pieces have to be continuously and collaboratively moved to get them to the right places. This was a great step in the design development. By using game-based principles and mnemonic techniques while embedding the contents of The Qur'an, this puzzle helps one memorize information that would otherwise need to be committed to memory through rote memorization.

By using colors, the names of the chapters are visually grouped based on their subject.
The different colors used to group information with similar themes employ the method of chunking. This helps a player create mental and visual cues, as well as remember parts of information of the entire puzzle by grouping them based on colors or topics, which can later be used as cues to help them recollect information more efficiently. The Surah numbers are engraved on the corner of each piece, which matches the meanings of the names of the Surahs etched on the base. This puzzle takes some time to solve. The challenge in solving it is also the motivation that keeps the player(s) engaged. The goal is to help the user memorize the names, meanings, and their numbers as they move the puzzle pieces corresponding to their meanings. This can be played by single and multiple players, young and adults alike.

Above: Fig. 23: Puzzle Iteration 2
Below: Fig. 24: Puzzle at play

9

development
of design
outcome

The above explorations, outcomes, and feedback laid the foundation for the creation of a digital game-based learning tool. A mobile app that speaks in the language of Digital Natives was desirable and needed as justified previously. Sharing the vision with friends and family, who would be potential users of this outcome and their incredibly positive responses validated the need further. A memorization app for the fast-paced, highly stimulated, multi-taskers was in the making. The goal of this app is to make the memorization process more pleasurable, engaging, and enriching by superimposing the game design elements and memorization techniques explained in the conceptual framework. Creating an app for mobile devices will make the tool accessible and portable to users young and old, across various cultures, as well as teachers, parents and students.

Experiements under the theme of Deconstruction, and Play to Memorize merge together to inform the foundation of the design outcome. The design synthesizes several elements explained earlier in the Background section: mechanics, dynamics and aesthetics of game design, along with the memorization techniques chunking, and method of loci.

PROCESS

ANALYZING SUCCESSFUL GAMES AND INTERFACE DESIGNS

Analyzing the development process of a successful digital app, interface and interaction design form an important part of the process. These are explored utilizing the conceptual framework stated earlier. My research methodology involved gathering data by downloading various apps and testing them. This included games to understand the user interface, game mechanics, dynamics, as well as aesthetics which were utilized to enhance the memorization methods selected in this research. Simultaneously, existing Qur'an memorization apps are explored to derive the essential components significant to the memorizer of the Qur'an. But first, let's understand what interaction is, and second, let's explore some of the apps and games.

USER INTERFACE:

Everett N McKay, author of UI is Communication, summarizes the principles of user interface design (UI). He defines UI as a conversation between users and a product to perform tasks to achieve the user's goals.[41] Below is a comprehensive summary of the principles of UI, which helped me evaluate existing apps under the conceptual framework of this research:

- Communication-driven design process: The key challenge to successful user interface is to understand what needs to be communicated to the users, and to let this communication drive the design process. The tasks need to be communicated to users in a clear and concise way, without the distracting presence of the designer.
- Any UI can be evaluated by what it communicates and how effectively it does so: McKay argues that mechanically enabling tasks is only the first step--not the only step--in a great design. He states that the end user of the interaction is "an emotional, impatient, error-prone human," establishing higher expectations that simple functionality.
- Beyond the adage, "form follows function," in UI design, form follows communication. Every visual design element must be justified by what it communicates. If an element doesn't communicate anything, it must be removed, and if it communicates poorly, it must be redesigned. McKay further explains that what may seem subjective, emotional, arbitrary, and aesthetic may actually be objective, rational, coordinated and principled.

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[41] Everett N. McKay, "Summary of the Top Principles," in UI Is Communication (Morgan Kaufmann, 2013), http://proquest.safaribooksonline.com.proxy.library.vcu.edu/book/software-engineering-and-development/9780123969804/introduction/cesectitle0040_introduction_html.

Users are emotional and react emotionally to a product's visual appearance.
• If the product's visual appearance is of questionable quality, users naturally assume that the rest of the product has the same level of quality.

Because digital natives are the target audience of this research, McKay's UI principles have been applied to evaluate and analyze existing apps with their perspective in mind. This evaluation and analysis is further used in the interface design of the project outcome. Having downloaded, played, navigated, evaluated and analyzed 100+ game apps, memorization apps, and game-based learning apps from the App Store, what follows is a list of examples and a summary of goals that impacted the design outcome.

MONUMENT VALLEY
by Ustwo Games Ltd.

Genre: Games
Target Audience: Ages 4+
Compatibility: iPhone, iPad, iPod Touch, Android,
Google, and Windows
Awards: Apple Game of the Year Award 2014, Winner
of Apple Design Award 2014.

Description, Story & Gameplay:
Monument Valley is a dreamlike exploration through
outlandish architecture and impossible geometry. The
player leads the silent princess Ida through mysterious
monuments, to uncover hidden paths, unfold optical
illusions and outsmart the mysterious Crow People.

UI, Game Design Elements:
The goal of the production team of Monument Valley
was to create a piece of work that would excite the
player, but never frustrate. They wanted the players to
linger just long enough to experience uniqueness and
delight. The game had no real failure or set tasks to
achieve: no stars to collect, no leaderboards. Design-
ers envisioned players experiencing a cinematic game,
similar in duration to a film.[42] Gameplay is divided into
chapters, with successful completion of each chap-
ter unlocking a subsequent one. Upon downloading
this game and playing it, I was hooked. So was my
husband, and my younger brother. My younger broth-
er loved it so much that he downloaded Monument
Valley II, completed the entire game, and was hungry
for more.

Easy-to-follow visual navigation cues, such as doors
and stairs communicate the proper interaction se-
quence, as the player guides Ida through the game.
The technical difficulty of creating impossible geome-
tries in a navigable on-screen environment, presented
designers with a huge challenge, and the beautifully
resolved outcomes at the heart of the game's puzzles
are what make it so special.[43] Every chapter in the
game is unique, every step is interactive, with trigger
and feedback, and every moment is beautiful.

Monument Valley's game dynamics, aesthetics and
game mechanics provided an aspirant model, as I
attempted to design a memorization app for digital
natives—aesthetically captivating visuals, a simple,
intuitive interface, clear game mechanics, and engag-
ing game dynamics.

Effective use of game design and UI principles create
an emotionally appealing and intuitive gameplay. The
game has been enormously successful, with a total of
over 25 million downloads since its launch, across all
platforms including iOS, Google, Amazon and
Windows.[44]

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[42] ustwo, "Monument Valley," accessed April 14, 2017, https://ustwo.com/work/monument-valley.
[43] ustwo.
[44] ustwo.

Fig.25: Still from Monument Valley.
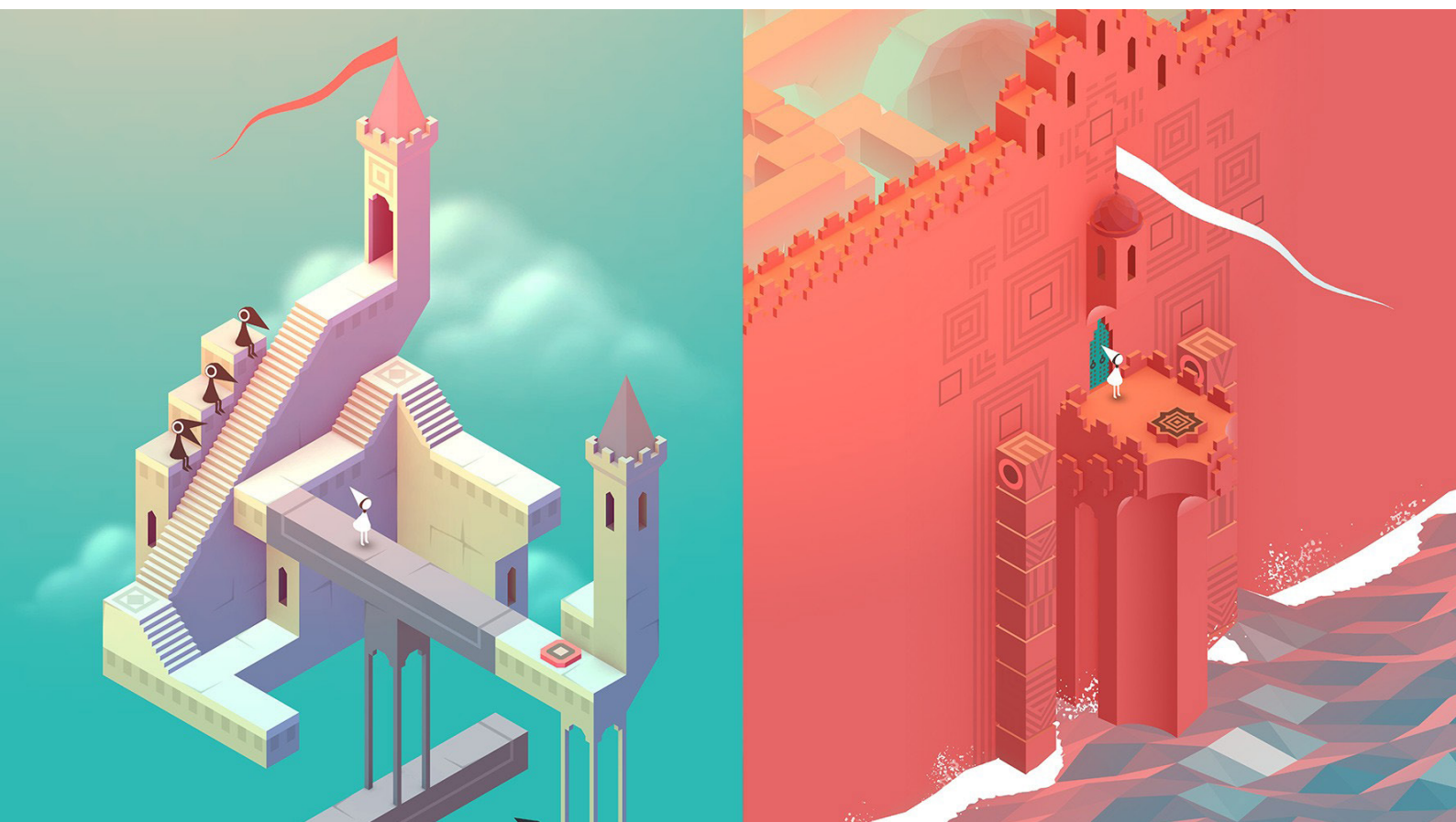
Fig. 26: Still from Monument Valley.

16-Sept '3

Fig. 27: Process sketches from the development of Monument Valley.

UNLOCK

↖ statue?

A

B

A

B

UNLOCK
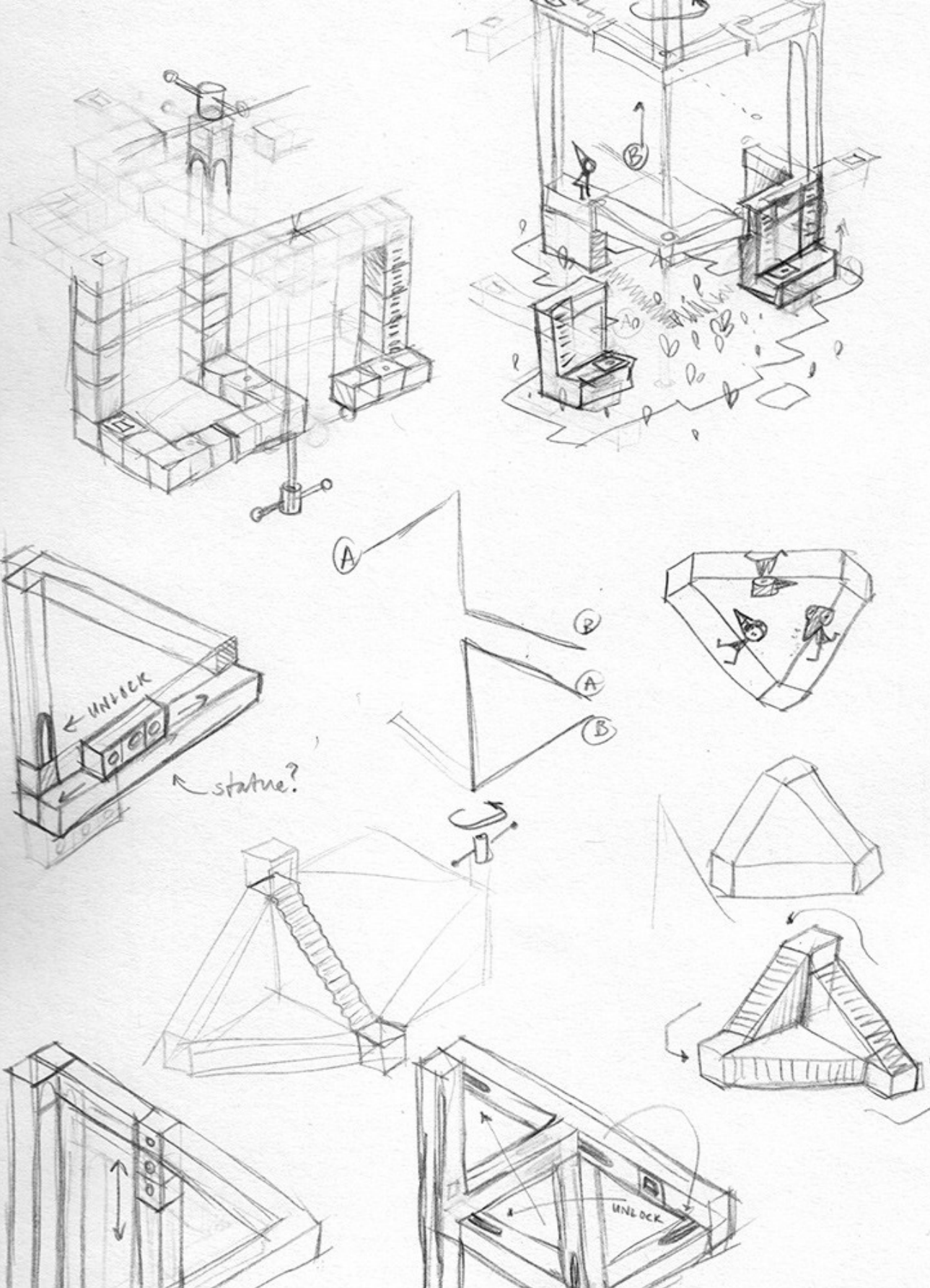
WORDLINGS

by Smashing Ideas Inc.

Genre: Games
Target Audience: Ages 4+
Compatibility: iPhone, iPad, and iPod Touch

Description, Story & Gameplay:
Wordlings are alien creatures who conquered our language and then forgot it. Players help the Wordlings unpuzzle our language and together they work to become masters of the WORD GAME universe. Wordlings combines six distinct word puzzles and games, in one unique gaming experience. With both solo and multi-player modes, players can play against their own highest score, and also challenge friends and unknown opponents.

UI, Game Design Elements:

The creators of Wordlings assimilated all existing dictionaries into one content ecosystem, which allowed them to cross-reference all words in the English language based on their popularity of use.[45] This step resulted in the most robust word-game dictionary available, which boasts a range of thirty-letter words. Wordlings, in ways similar to Monument Valley, is mentally challenging and stimulating; however, Wordlings provides constant feedback, a reward system of points, orbs, Wordlings, tickets, and much more. Its UI is easy to navigate, with a collection of different puzzles. These characteristics explain its appeal to digital natives, providing them a variety of engaging interactions, constant feedback and triggers, a sense of progress, and motivation-providing exit and entry points.

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[45] "Wordlings," Smashing Ideas (blog), accessed September 14, 2017, https://smashingideas.com/work/wordlings/.

Fig. 28: Wordlings, word puzzles, and in-game explanations.

JOURNEY

by thatgamecompany

Genre: Adventure, Art Game
Compatibility: PS3, PS4
Released: March 13, 2012

Description, Story & Gameplay:

Players of Journey experience wonder in a free-wheeling adventure, where they travel through life, connecting with companions along the way. Players learn from each other, with experienced players providing wisdom to new players. Players constantly reflect on what they can learn from these interactions, using obtained knowledge to overcome challenges along the way. The goal of Journey is to reach the looming mountain top, separated from the start by miles of burning, sprawling desert. The passage is difficult, but along the way, players discover who they are, learn about the place, and experience a constant sense of progress as they seek the destination.

UI, Game Design Elements:

A defining characteristic of the game mechanics is a fluidity of movement experienced by the main character, who is adorned in a robe, with a scarf that grows increasingly long as the player progresses. The character has an incredibly natural, fluid motion, human-like, but unbound to purely human behaviors. Gliding, floating mechanics, with the cloaked figure moving about on legs that end in single points, produce a flowing, dream-like atmosphere.
Journey, with its a graceful, flowing movement, and its character's steady, gradual accumulation of knowl-

edge, recalled for me the process of Qur'an memorization, where the entire process can be compared to a journey. Throughout the memorization journey, a learner links various verses of the Qur'an, connecting the topics of various Surahs, and connecting spiritually with God.[46] Individuals memorizing the Qur'an, like the character in Journey, also connect with more experineced peers, sharing lessons and insight.

Attracting 100+ industry awards and media accolades, includingGame of the Year in 2012, Journey provides stunning visuals, haunting music, unique online gameplay and an immersive experience. It provides solitary moments of reflection, as well opportunities for companionship. Similar to Journey, the Qur'an is filled with parables, visuals, stories, moments of insight, and adventure. My challenge, I realized, was to find ways to incorporate exploratory engagement, interaction and narration through the effective synergy of game design and proven memorization techniques.

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[46] Talk Islam, The Quran Kids | Short Film | Inspirational, n.d.,
https://www.youtube.com/watch?v=ayainbNE4D0.

Fig. 29: A still from the Journey game.

MEMORIZE THE HOLY QUR'AN

by BIGITEC GmbH

Genre: Education
Target Audience: 4+
Compatibility: iPhone, iPad and iPod touch.

Description:

Memorize the Holy Quran aims to ease memorization of the Qur'an, with all chapters of the Qur'an grouped into Juz 1 through Juz 30. It features various elements of gamification principles, such as profile creation, and a progress indicator. Learners can jump to any juz, choose any particular surah, and memorize as many verses as they wish. The app allows learners to create playlists, to target specific verses, and to create multiple user profiles, with avatars and names. High quality audio recitations, by popular Shuyukh (reciters), is combined with approved Arabic font type. Learners can also speed up and slow down recitations (fig. 30), or listen to audio in loops, to increase repetition. This app cannot be analyzed using McKay's UI principles, since it does not meet the criteria of game-based learning. Still, its features add value to the traditional Qur'an memorization process, including its ability to control the number of repeats, its feature allowing learners to select the number of verses to memorize, audio choices it offers, its progress chart, and the index it provides of surahs of the Qur'an.

Fig. 30: Memorize the Holy Quran, screenshot.
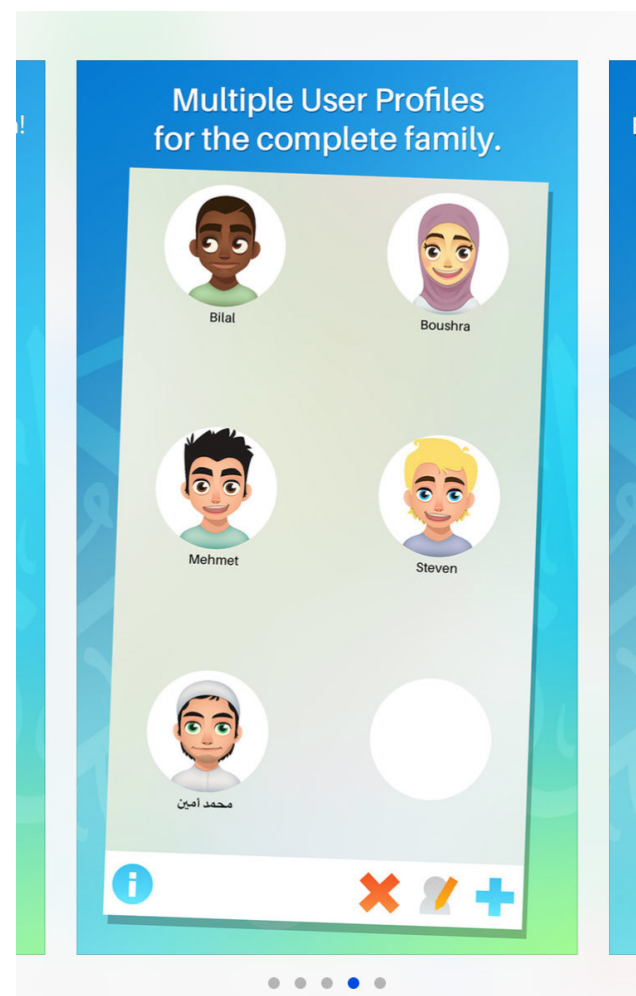
Fig. 31: Memorize the Holy Quran allows learners to create multiple avatars.
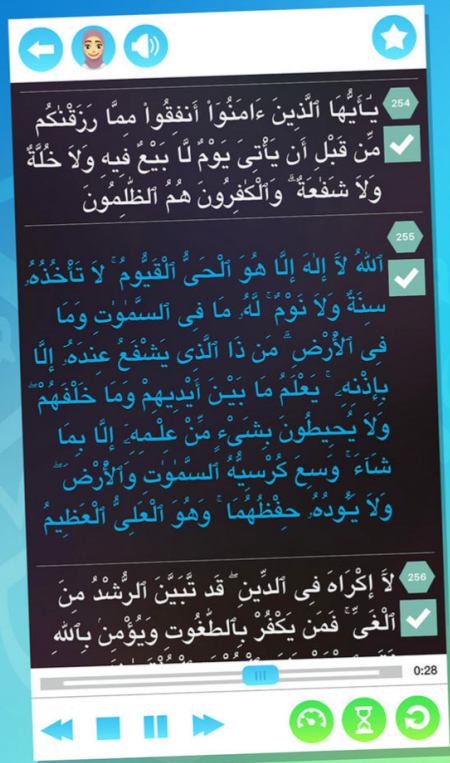
Fig. 32: Memorize the Holy Quran allows learners to loop and repeat selected verses, to aid memorization.
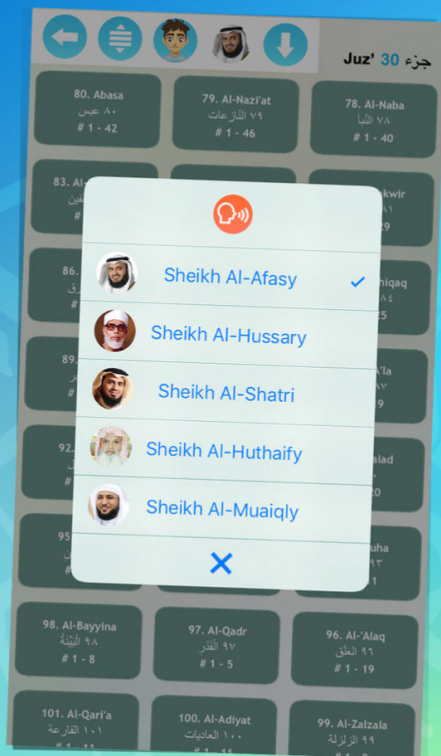

Fig. 33: Memorize the Holy Quran allows learners to select readings from famous Shuyukh (reciters).

KIDS MEMORIZE QUR'AN WITH AUDIO & MP3

by Maissa Mohamed

Genre: Books
Target Audience: 4+
Compatibility: iPhone, iPad and iPod touch.

Description:
Similar to Memorize the Holy Quran by BIGITEC GmbH, Kids Memorize Quran with Audio & MP3 contains features such as a progress indicator, ability to loop and repeat verses, create profiles, control the speed of recitation, and create custom playlists. Like the previous Qur'an memorization app, this app falls outside of the criteria of game-based learning.
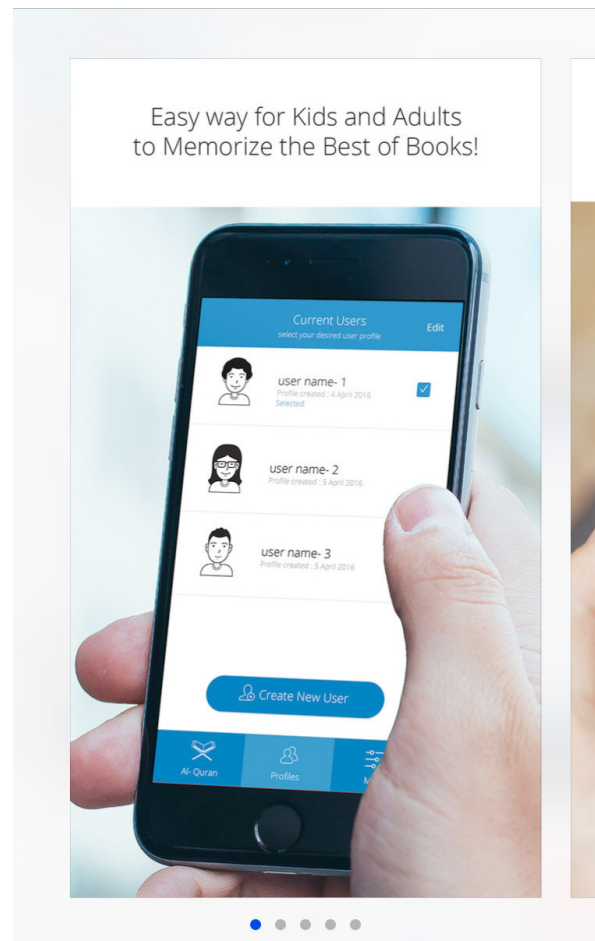
Fig. 34: Kids Memorize Quran with Audio & MP3, screenshot of opening page.
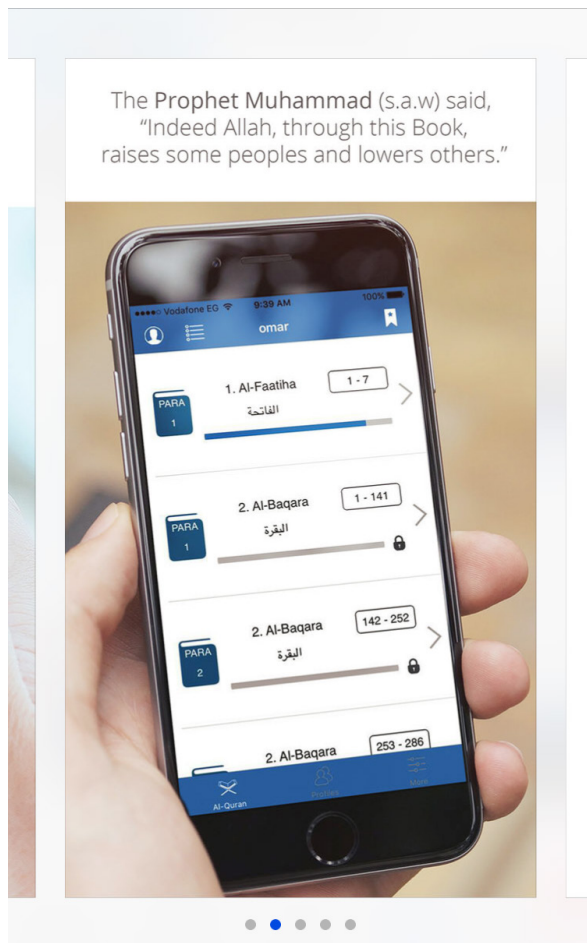
Fig. 35: Kids Memorize Quran with Audio & MP3, allows users to select and repeat chosen passages.
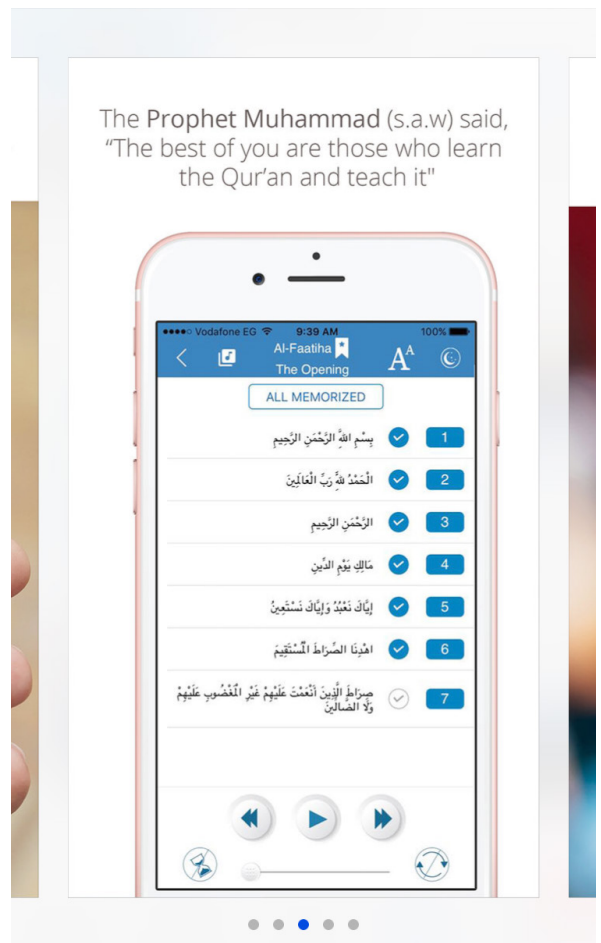
Fig. 36: Kids Memorize Quran with Audio & MP3, allows users to track passages already memorized.

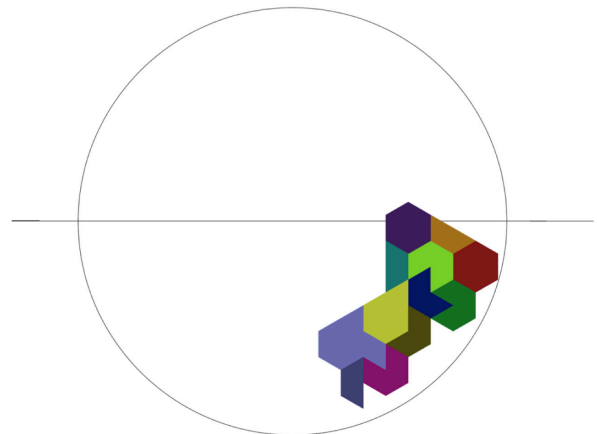# DEVELOPMENT OF STRUCTURE OF THE QUR'AN

In the above exploration, the entire structure of the Qur'an was taken as a linear arrangement, with the journey of the memorizer being a linear one. This, although had many strong aspects to the journey of memorization, was low in the quality of addressing the repetitive, the interconnectedness of the Qur'an and it's Surahs and hence was eliminated.

Further Development of the visual structure of the Qur'an, which serves as a progress indicator, as well as the index of the   Surahs in the Qur'an.
An iterative process is followed for finding the right outcome for this step using the principles of Islamic geometric pattern and mosque plans. Islamic Geometry is derived by following underlying grid systems which result in beautiful, abstract geometric patterns which isntill a sense of beauty, and awe. I chose to follow a hexagonal grid system to guide me in the process of designing an aesthetically profound outcome. The resulting outcomes were assessed based on aesthetics, as well as the practicality of the system. Does the system work for one verse, one Surah, a group of Surahs, a Juz, and the entire Qur'an? These questions were juxtaposed in each iteration to derive a system that work best for the structure of the Qur'an.

Following are the various steps undertaken and the final outcome. To make the challenge tangible, the structure of the Qur'an is explored for the 30th Juz, the last section of the Qur'an. A verse was considered as the smallest unit. Taking the smallest unit in the grid as an equilateral triangle, the shapes for each surah was created starting with the last Surah of the Qur'an, the 114th Chapter, Surah Al- Naas, which consists of six verses.

In each following diagram, a certain set of rules were followed to get the resulting patterns.


In above diagram, an isometric grid of equilateral triangle was used to derive shapes of individual Surahs. There are some Surahs in the Qur'an with same number of verses. The shapes corresponding to the Surahs with same number of verses were kept the same.
In the following experiment, all parameters were kept the same, except the shape of the surah was changed regardless of the recurring number of same verses.
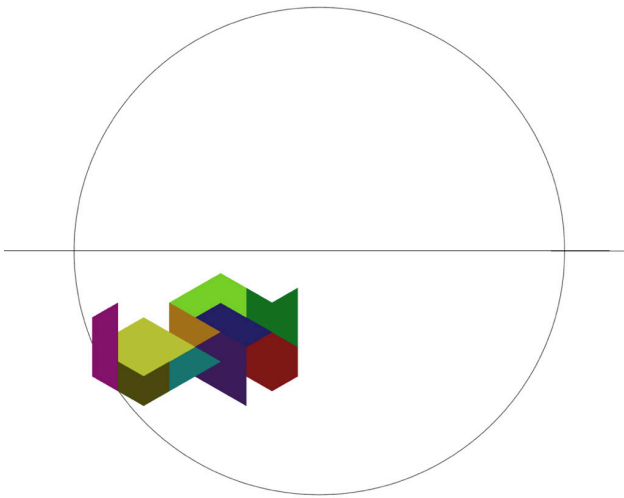
Following the circular experiments, keeping the parameters the same as the previous experiment, the shapes were placed within a parallelogram. The resulting pattern was intriguing, however there were white spaces/gaps between the shapes.

Keeping above parameters, the shapes of surahs derived based on the number of verses were now made unique for each Surah. This creates a more complete and compact arrangement visually, while having the interest and individuality of each Surah at the same time.
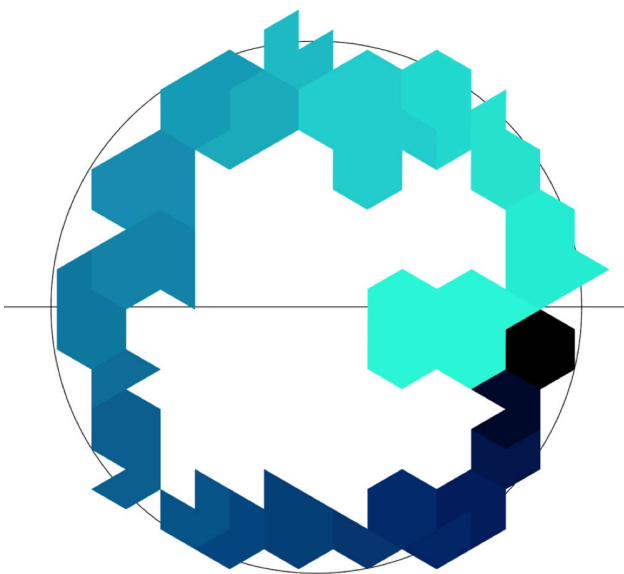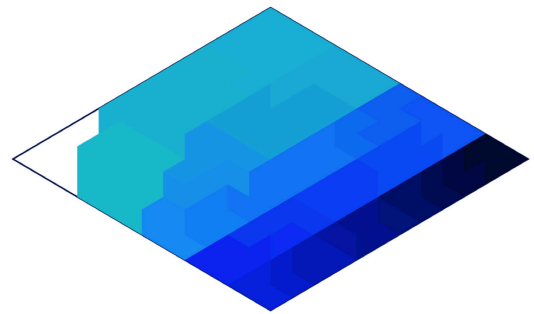
Upon testing the above solution on the 29th Juz, I realized that I had overlooked a variable which disrupted the practicality of the entire system. The above system that takes each aya as a triangular unit of the grid system, does not synchronize with Juz 29, and so on. This is because the number of verses in each Juz is not the same despite each Juz containing the same number of pages. This is because of the variability of the length of the ayah.

In the diagram above, the parameters were kept the same, including the shapes derived from the Surahs with same number of verses. The shapes were arranged in a circular manner within the outlined circle (representing a Juz) to get an idea of how the entire Juz would look.This did not seem aesthetically and systematically smooth outcome due to many variables in the system, which magnifies when one considers the entire Qur'an.

After many iterations and problem solving the various stumble blocks, the spiral structure (fig. 37), which is a system of linear progression from the outer Surah to the inner Surah, or vice-versa. This system worked in parallel to the topographical structure of the Qur'an. The spiral grows outward from the center, from right to left, or inwards, with the last surah of the Qur'an being at the center. Placing the last Surahs first lays the foundation of building the larger surahs as one moves towards the beginning of the Qur'an. Starting from the end of the Qur'an is also light to the process of learning as memorizers of the Qur'an begin their memorization journey with the short surahs.

Taking each triangle represents an aya, this structure cocoons around the last surah of the Qur'an, Surah Al-Naas. Each color represents a Juz, and each tint of a particular represents a surah. The black represents the end of a juz. In the spiral structure above, all the different tints of the red color represent Juz 30, whereas all the tints of the orange color represent juz 29, the next color correlates to the 28th juz, and so on. This system works fluidly with the way that the various divisions such as juz and surahs are differentiated in the Quran. Theis structure was used as the foundational structure and edited further to make it a visually compelling, and a practically efficient index of the entire Qur'an.

Fig. 37: Index of the Quran (Juz 30- Juz 27)

In this system, each verse is represented by a triangle. The structure is built with the shortest Surah as a starting point. This Surah has 6 verses, which result in a core which is hexagonal in shape due to 6 triangles forming its visual structure. The successive Surahs envelop this hexagonal shape in a clockwise direction, following the same system, thus resulting in the entire structure. Each distinct color in the spiral represent a Juz. Each tint of that color represents a Surah. There are areas where one will notice gradients of two colors. This signifies the overlap of a Surah across two Juz. For instance, Surah Al Kahf, the 18th Chapter of the Quran spans over two Juz, with a few verses in one Juz and the remaining in the next Juz. This overlap is signified by a gradient of both the Juz that Surah Al-Kahf spreads across.

If one views the structure and moves from the outer Surah to the inner Surah, one will go anti-clockwise, with the hexagonal shape as the end point.This motion or journey of moving from outside to the inside also symbolizes the movement of Muslims towards the Ka'ba represented by a black cube, and the centrality of the Ka'ba in the life of the Muslims. The structure thus functions as the index of the Qur'an, while embedding deeper metaphors that are meaningful to the memorizer the Qur'an.

This structure is used in the design outcome.

Fig. 38: Visual Index of the Qur'an.

CREATING
APP SCREENS

Following extensive analysis and evaluation of existing apps related to my research objectives, I created a series of storyboards, with sketches and notes to help me visually explore the content of my app, similar to the process of storyboarding a film's production. The storyboard provided a means to understand the interface, as well as the gameplay and narrative. This became the anchor for further steps such a designing visual icons to cue users' decision making. The storyboards helped me gauge the legibility of various app components, such as the geometric index of the Qur'an, (fig. 38). Storyboarding also helped me produce a coherent aesthetic environment, within which all activities shared a common visual language. While going through this iterative process, I confronted and addressed other questions, such as what does the user input look like, what types of feedback does the app provide, how do users navigate incremental stages, which memorization techniques are most effective in a given situation, and what types of challenges best reinforce retention.

Following is the storyboard exploring screen se-
quence, with notes to aid creation of the app trailer
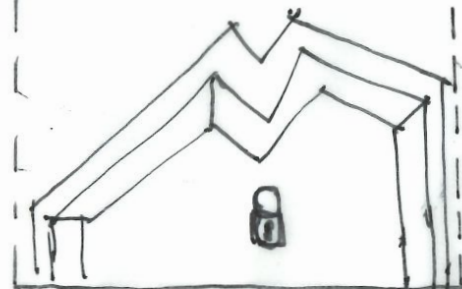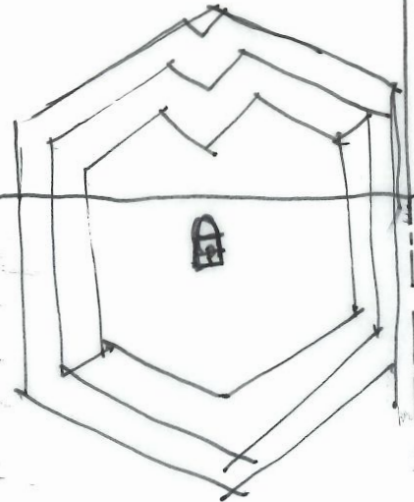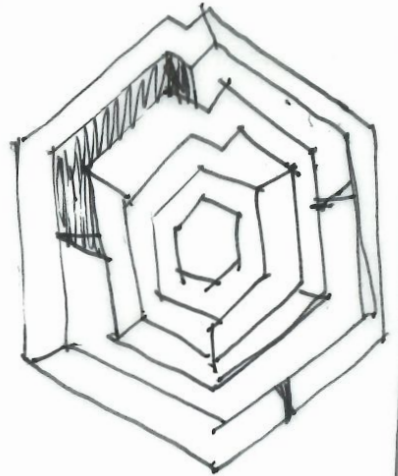animation. These evolved and developed further
through the design process.

1

صلة
SIL

LOGO ANIMATES TO SHOW THE CONCEPT OF "LINK"

2

HELP ILM RE CONNECT WITH THE MOSQUES AROUND THE WORLD

'ILM' → ABSTRACT CHARACTER →
ILM → KNOWLEDGE
ILM IS REPRESENTED AS A WHITE BLOB

IT CHANGES/MORPHS SHAPE AS IT MOVES AROUND.
IT BECOMES DIM WHEN MEMORIZATION ISN'T DONE. IT GLOWS WHEN MEMORIZATION IS COMPLETE.
(EACH VERSE)

3

... SURAH.

GROUPS OF 3 JUZ/ SECTIONS FORM ONE STRUCTURE.
THE FIRST STRUCTURE IS UNLOCKED FOR USERS TO START. THEY CAN START ONLY WITH THE LAST SURAH OF QUR'AN.

THE STRUCTURE ANIMATES TO SHOW HOW THE PIECES COME TOGETHER, & THEN SEPARATES INTO 3 SECTION STRUCTURES

4

(ARABIC &)
93 SURAH AL-DUHA

MORNING GLORY

REVEALED IN MAKKAH

NO. OF VERSES : 11

"SELECT THE
VERSES TO
MEMORIZE"

TRIANGULAR
TRIANGULAR PIECES
COME TOGETHER TO
FORM SURAH SHAPE

USER CHOOSES
VERSES.

TAKES THEM TO
THE NEXT SCREEN

5

GOD'S

RE-ASSURANCE

EACH CHAPTER
(AND VERSES OF
THAT CHAPTER) HAS
THE OVERALL MEANING

TO RE-INFORCE
THE MESSAGE OF
THE SURAH UNTIL

COMPLETION OF
MEMORIZATION OF
THAT SURAH

SCREEN 1

6

ARABIC
TRANSLITERATION
TRANSLATION

PIECES COME
TOGETHER
WITH ILM
WALKING ON
PATH

WHEN ILM
REACHES END,
PUZZLE /
MEMORIZATION
SCREEN APPEARS.

USER CAN
CHOOSE ONLY
2 OPTIONS AT A
GIVEN CHANCE

EITHER ARABIC &
TRANSLATION
OR
TRANSLITERATION
& TRANSLATION

6

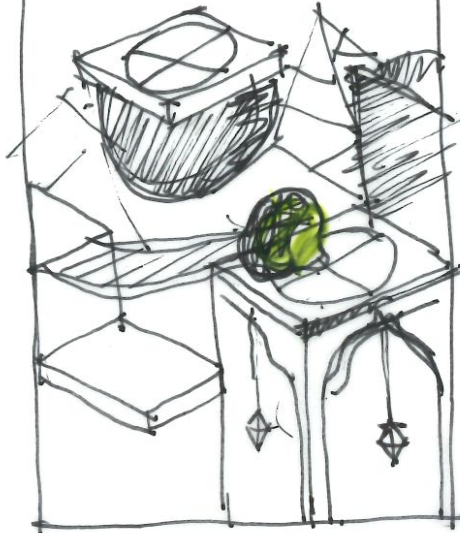ARABIC
TRANSLITERATION
TRANSLATION

7

ARABIC

11

BACK TO
SCREEN 3

AFTER
COMPLETION
OF SURAH

PIECES COME
TOGETHER
WITH ILM
WALKING ON
PATH

WHEN ILM
REACHES END,
PUZZLE/
MEMORIZATION
SCREEN APPEAS.

USER CAN
CHOOSE ONLY
2 OPTIONS AT A
GIVEN CHANCE

EITHER ARABIC &
TRANSLATION
OR
TRANSLITERATION
& TRANSLATION

USER TAKES
ILM ON A
JOURNEY/QUEST
TO SOLVE
PUZZLES &

POINTS BASED
ON ISLAMIC
CONCEPT OF
REWARD OF EACH
LETTERS.

1 LETTER = 10 REWARD = 10 POINTS

· EACH VERSE
COMPLETE = 1 MEDAL

EACH SURAH = 1 TROPHY

EACH JUZ = 1

COMPLETION
OF MEMORIZATION =

SHOWS
MEDAL
(ANIMATION)

SHOWS
NUMBER
OF VERSES
COMPLETED
FROM SURAH

ILM
CELEBRATES

PROMPTS
TO SHOW CHOOSE
NEXT
VERSES

Following the storyboard exercise, I identified other key questions: What does the visual environment of the app look like? How do I insert the learner in this visual environment? If there is a character, what does it look like? What is the story and gameplay of this app? How does it link to the process of Qur'an memorization? How do the different elements of this environment speak to individuals attempting to memorize the Qur'an?

To address these questions, I had to think visually and spatially. I began to sketch and create paper prototypes.

From the surah index, I chose the 93rd Surah to pilot my approach. I extracted the surah shape (colored in brown, see figure 39) from the index, and extruded it to create a 3-dimensional form. I also imagined how this form might be broken down further, so the pieces might come together, like pieces of a puzzle.
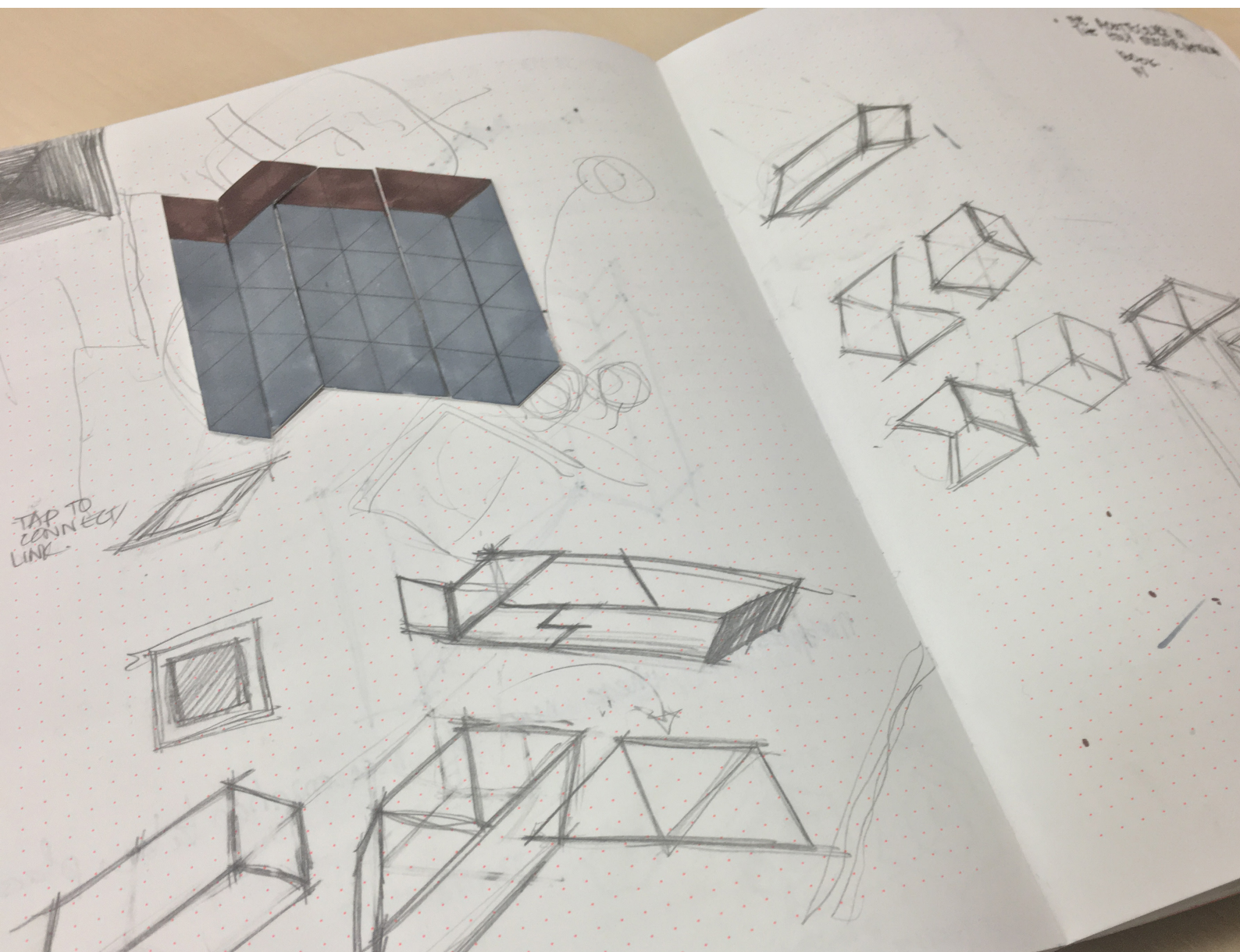
Fig: 38: Visualizing the 93rd Surah, which has 11 verses. The brown color shows the profile from the Qur'an index, the shape of the entire 11-verse surah, while the grey triangles add volume and height.
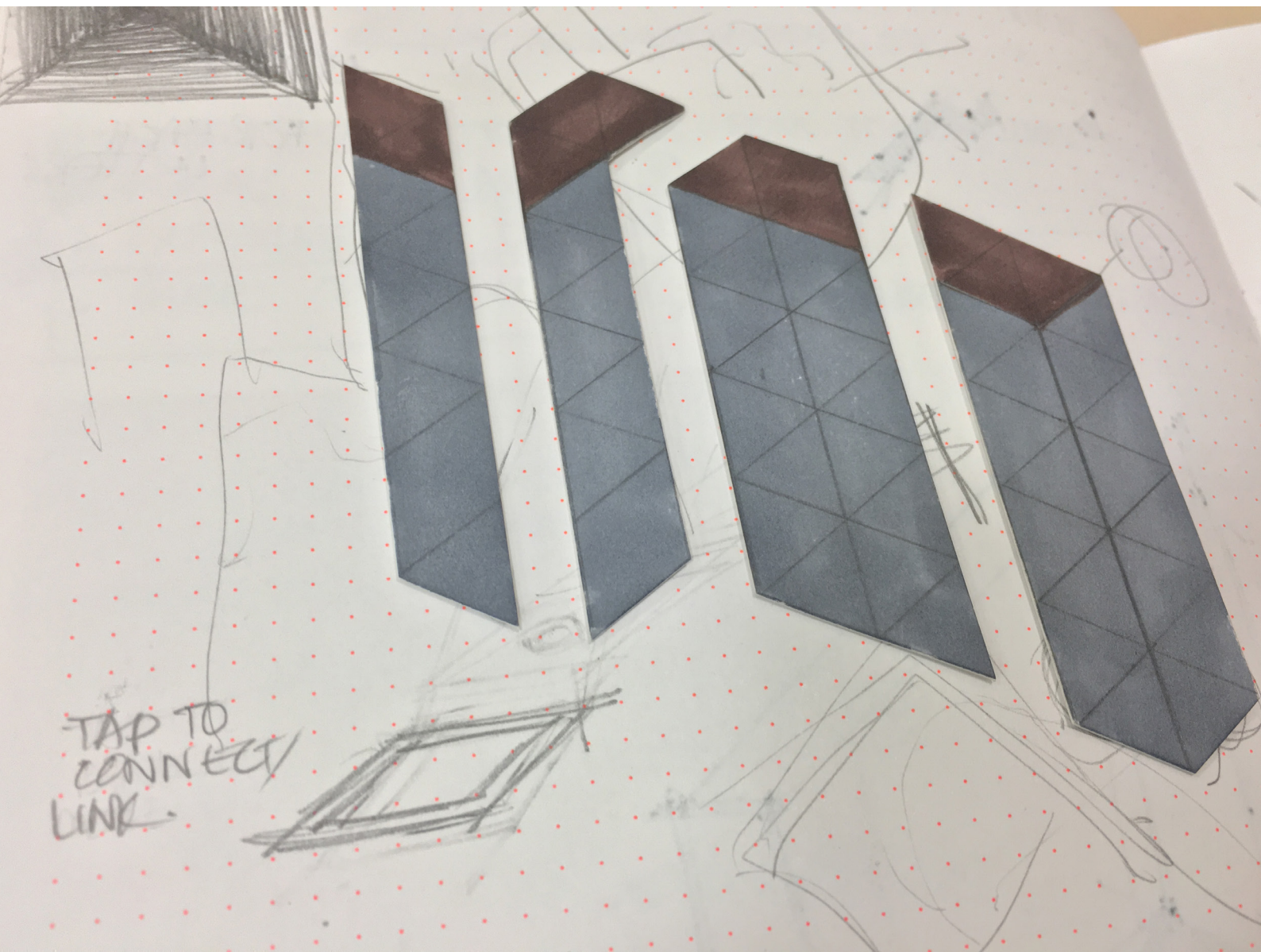
TAP TO
CONNECT/
LINK.

Fig. 40: Following the memorization method of chunking, I cut down the shape and grouped the verses into component parts.
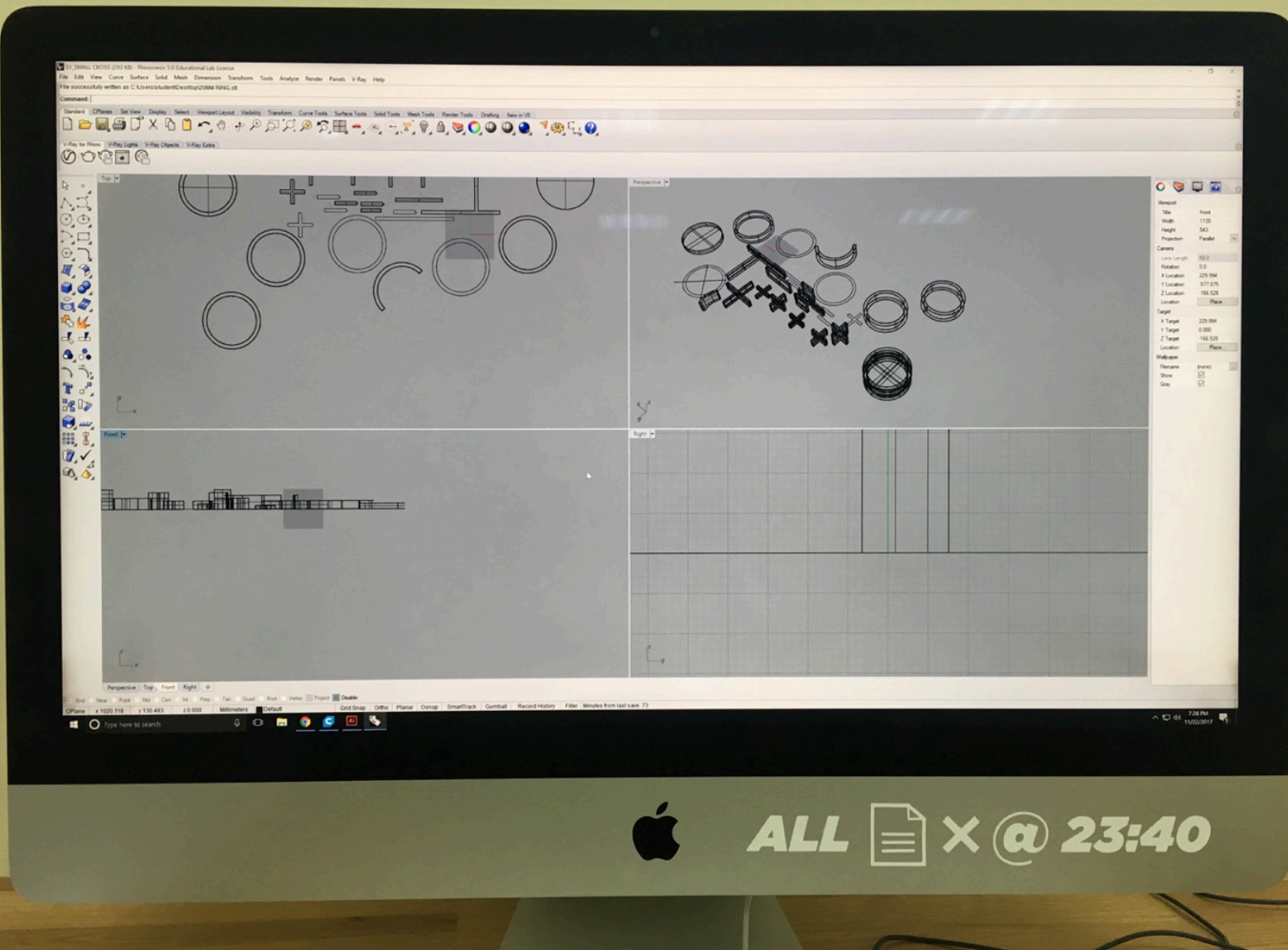
Fig. 41: 3D modeling basic elements inspired by Islamic geometric patterns, following the principles of Lego blocks.

Next I engaged a series of generative exercises, with the goal of exploring how these pieces could make sense to the user. What is the underlying story? What are the elements of gameplay? I made three-dimensional models, using lego pieces, computer software, foam core, and the 3D printer. Each of these activities allowed me to imagine a digital environment where the gameplay takes place. I derived inspiration from Islamic geometric patterns as well.

Utilizing design elements of Islamic geometric patterns, I began to model basic shapes and forms to play with, in order to build and rebuild– just as I did with the lego pieces and the previous experiments.

Fig. 42: 3D-printed components, inspired by Islamic geometric patterns, that form the basics of a kit-of-parts.

Interacting with these physical objects triggered an important epiphany: memorization of the Qur'an most often takes place in memorization centers housed within mosques. What if the app were set within a digital world inspired by features of famous mosques--a virtual world players could navigate and associate with stages of memorization along the way.

The State Mosque of Qatar (fig. 44), known as the Mosque with 99 Domes, provided the setting for my exploration of the 93rd Surah. Extracting the mosque's most distinctive feature, I created a 3D model using Rhino software. I took screenshots from various angles of the 3D model, once completed, to lay the foundation for illustrations that comprise the app's various screens. A simple device, of an inverted dome, which the user must flip upright by solving a puzzle, became the defining feature of the game for the 93rd Surah.
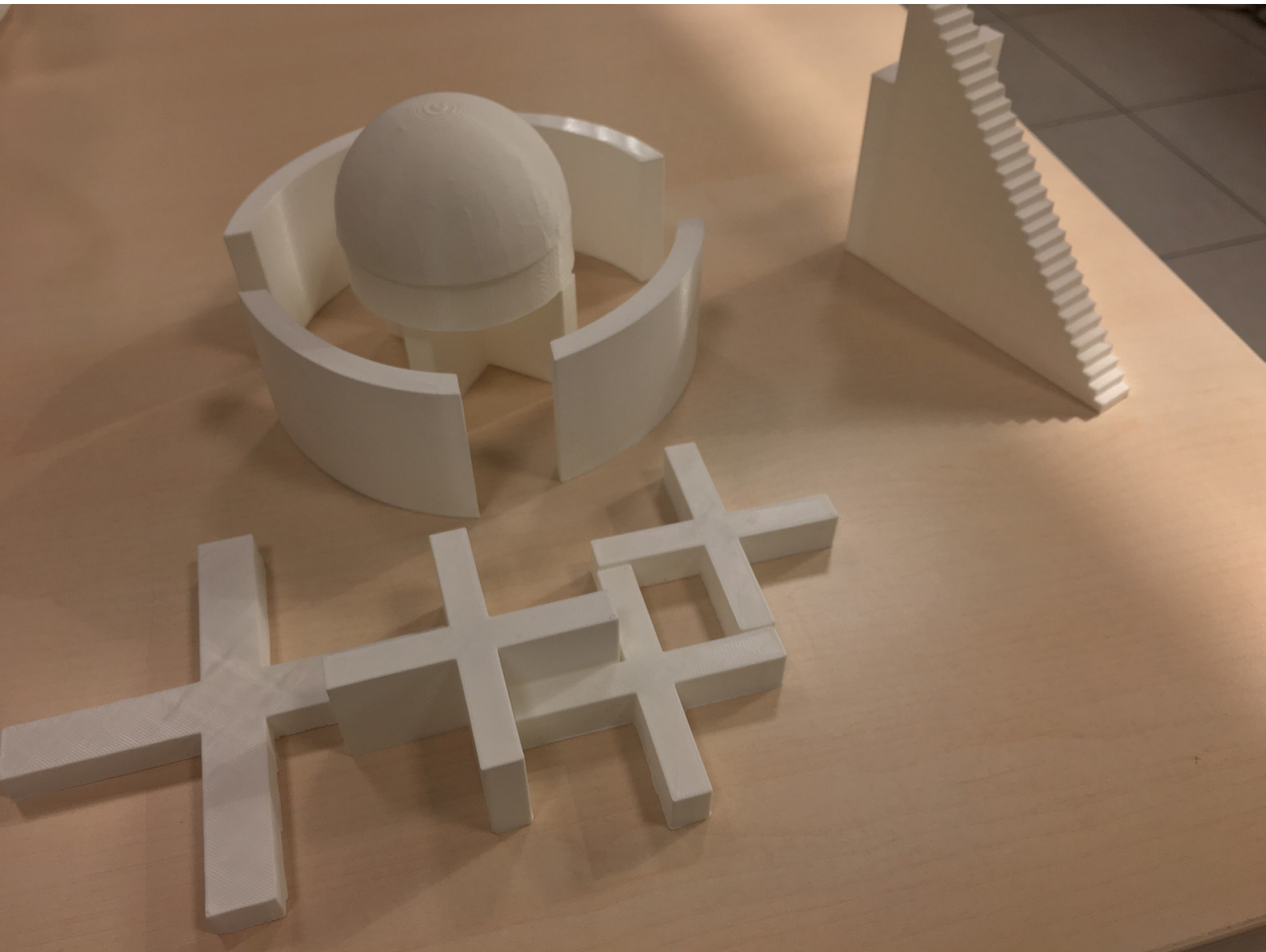
FIg. 43: Working with components from the kit-of-parts to build, play, assemble, and disassemble--all of which stimulated my creative imagination.

Because each Surah is unique, and because there are 114 Surahs in the Qur'an, I will be able to identify features of different mosques to create distinctive environments for different surahs. This will not only create a sequenced journey for the player, it will also create memory loci, using these spatial features, cues and forms as triggers to aid recall.

Fig. 44: The State Mosque of Qatar--the Mosque with 99 Domes.

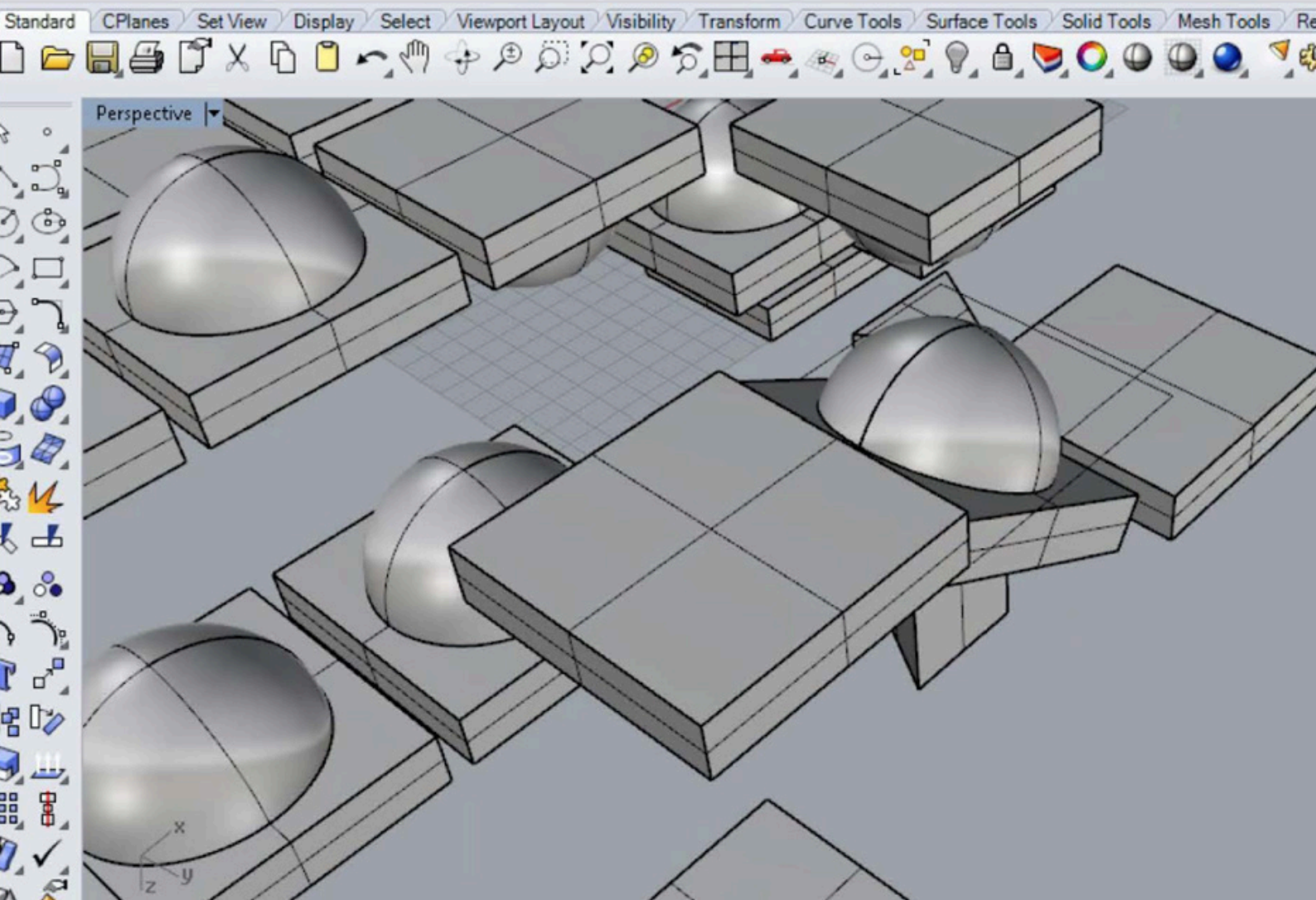Transforming subobjects... Press Esc to cancel

Command:

Standard | CPlanes | Set View | Display | Select | Viewport Layout | Visibility | Transform | Curve Tools | Surface Tools | Solid Tools | Mesh Tools | Re

Perspective |▼

Fig. 45: Screenshot of the 3D model created in Rhino software, inspired by the Mosque with 99 Domes.

10

designed
outcome

SIL:
DIGITAL GAME-BASED QUR'AN MEMORIZATION MOBILE APPLICATION

Sil is a game-based memorization application, designed to foster a more engaging, enriching and inspiring Qur'an memorization experience for digital natives. Combining proven memorization techniques with lessons from game design theory, Sil approaches Qur'an memorization from the perspective of digital learners. As discussed earlier in the Background section, digital learners thrive on constant feedback and information. By including elements of game design such as game mechanics and game aesthetics, Sil provides an engaging, challenging and interactive game dynamic, addressing the needs of digital natives.

The primary research outcome of the thesis is an animated trailer, which depicts the app's key objectives, conveys its atmosphere, and describes its operation.

SIL
IS A GAME-BASED MEMORIZATION
APPLICATION TO FOSTER A MORE
ENGAGING, ENRICHING, & INSPIRING
QUR'AN MEMORIZATION EXPERIENCE FOR
THE DIGITAL NATIVES.

Fig. 46: Sil.

NAME & ITS BACKGROUND

Salah, which is Arabic for prayer, is derived from the word silah, which means to link or connect. Silah eloquently expresses the Qur'an memorization process, because memorization of the Qur'an--more than a mere task--is about connecting on a deeper level with its content, and with God. Sil is the imperative verb of the noun Silah. Sil encourages one to take action: Link! Connect!

صل SIL

meaning:
link, connect
(imperative verb)

derived from:
silah صلة
link, connection
(noun)

Fig. 47: The word Sil.

BRANDING

Sil, the app's title, is unique, punchy, and prompts one to take action. It conveys the message: Link! Connect! The name is simple yet powerful, conveying a sense of energy, while preserving the honor of the Qur'an.

The color green, chosen for the logo, projects a sense of positive energy and growth. The logo is placed against a dark background to create an intimate atmosphere and sense of spirituality. The logo and text are built from geometric segments, to convey the concept of linking. With each segment a different shade of green, the subtle message is of one stronger whole, made of many parts (fig. 48 & fig. 49).

The same approach is applied to the multi-colored hexagonal diagram made to help users visualize the structure of the Qur'an. Each verse, or surah, is defined as a distinct part of something bigger. Breaking the whole into parts in the logo and the diagram also reflects a strategy employed to aid the process of memorization, where content is broken into smaller, more manageable bits.

Fig. 48: Sil English and Arabic logos.

Fig. 49: Sil logo, placed against a dark background to create an atmosphere of spirituality. Colored lines at the top of the frame reference a diagram used in the app to give players a sense of progress and orient them within the overall structure of the Qur'an.

GAME MECHANICS

THE CHARACTERS: ILM & NAFS

Ilm is the protagonist of the story, representing knowledge, light and guidance. Light, a symbol of knowledge, is the essence of Ilm's character. Ilm, as an enigmatic, glowing presence, is a metaphor for the process of Qur'an memorization, which fills one with spiritual light, knowledge, and guidance. Ilm also represents the game player, on a quest to memorize the Qur'an.

Nafs is the antagonist. He creates hurdles along the path of Ilm's journey. The word nafs, in Arabic, means self, or soul. There are three kinds of souls described in the Qur'an. One is called nafse ammara, which is prone to evil, and which will lead one astray if left unchecked.[47] In the game, Nafs, if ignored, ,becomes a source of destruction. Nafs takes the form of a tornado, swirling and determined to undermine Ilm's progress.

These two characters, and the concepts they personify, create a synergy between the gameplay and the app's storyline.

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[47] Abdul Ahmed, "Concept of Soul in Islam: A Study" (ProQuest Dissertations Publishing, 2009), http://search.proquest.com/docview/1789626095/.
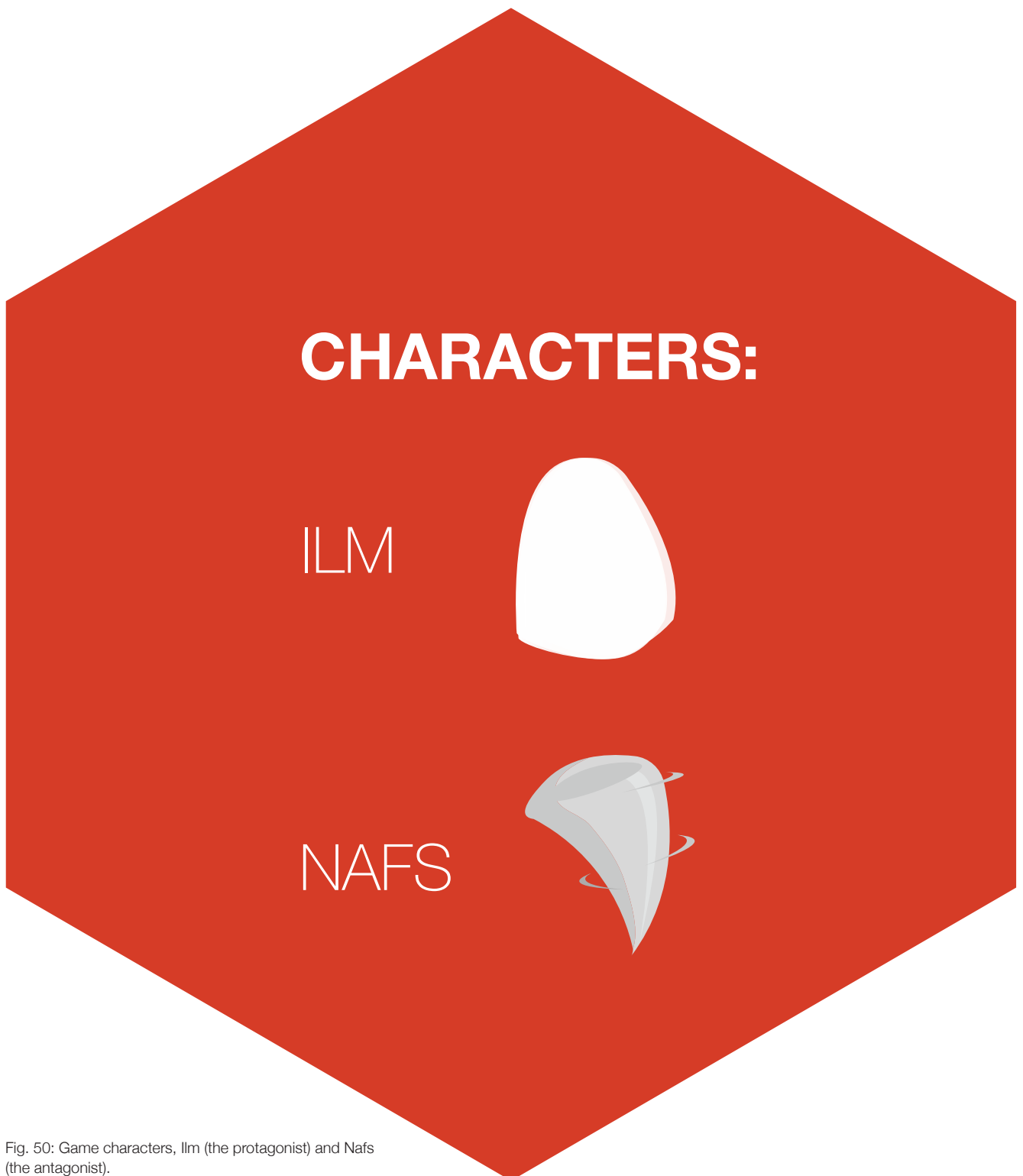
CHARACTERS:

ILM

NAFS

Fig. 50: Game characters, Ilm (the protagonist) and Nafs (the antagonist).

THE STORY
& GAMEPLAY

Ilm is on a mission to restore the lost kingdom. Play-
ers, represented by Ilm, link parts of his lost kingdom
by solving various puzzles and challenges. While
linking and connecting, players collects points. Nafs
is Ilm's disruptive enemy. His mission is to prevent Ilm
from making progress. Nafs puts forth various chal-
lenges to disrupt Ilm's journey. Ilm, as a result, must
solve additional puzzles to keep Nafs deactivated.
The game's achievement reward system is derived

from the Islamic principle of hasanat (reward for good
deeds: ten rewards for each letter of the Qur'an read).
Sil offers rewards in the form of points.For example,
in the Surah, Ad-Duha, the 93rd Surah of the Qur'an,
the word Ad-Duha (وَالضُّحَى) has 6 letters. The player
earns 10 points each time he repeats, or correctly
recollects this word. Players, motivated to earn more
points, are rewarded for continuing the memorization
process. By collecting 100,000 points, a player earns
one rare gem.Collecting all of the rare gems restores
Ilm's kingdom. The rare gems, once collected, form a
crown that is gifted to Ilm. The crown symbolizes the
great honor God presents on the Day of Judgment to
all who memorize the Qur'an.[48]

[48] "The Advantages of the Haafiz in This World and in the Hereafter - Islamqa.info," accessed December 1, 2017, https://islamqa.info/en/14035.

GAME
AESTHETICS

Memorization games and puzzles for each Surah take place within an abstract digital environment inspired by mosques from around the world. Mosques have been the center of Qur'an memorization and learning since its origin. Visual elements from specific mosques serve as markers, aiding players by forming memory loci. These markers, reinforced by gameplay strategies and other memorization techniques, assist players to recall specific bits of information, associating each Surah with its setting.

For instance, Surah Ad-Duha, the 93rd Surah of the Quran, serves as a case study in the app trailer animation, to show the game's operation. Game mechanics establish a pattern used to help players register, repeat, and recall verses. The player encounters three different challenges along an abstract path. The path, in this case, is set within an environment inspired by, the State Mosque of Qatar, known as The Mosque with 99 Domes. Domes form a distinctive feature within this pathway, and whenever Ilm comes across an inverted dome (fig.51), the player must solve a challenge to flip it to its proper orientation (fig.52). Reorienting the domes properly helps guide the game player, and aids memorization by creating memory loci based on color, sequence, and time.

Nafs also triggers unexpected challenges. The presence of Nafs is a sign of danger, and he can even erode a player's progress. Nafs adds an element of challenge, and also introduces spaced repetition, an effective memorization technique that prompts the player to periodically recall and reinforce prior lessons. The player must revisit prior content, solve Nafs's puzzle, and clear the pathway. Puzzles vary by degree of difficulty, and players also encounter a variety of game mechanics, to keep play stimulating and empower effective memorization.

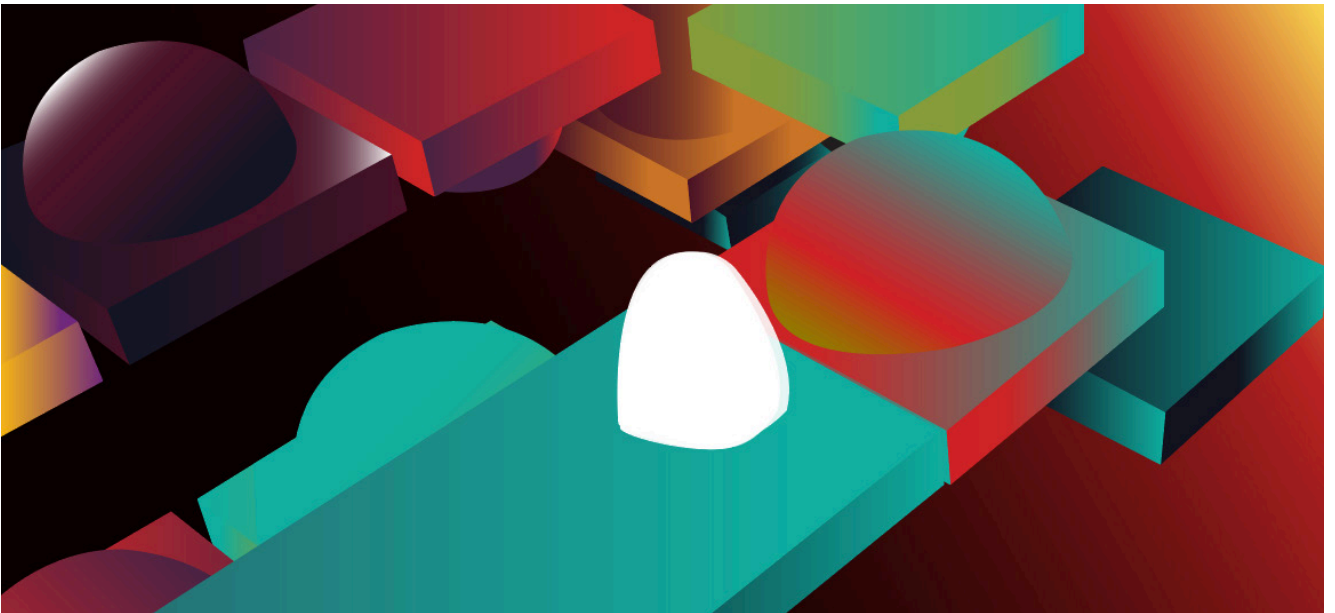Fig. 51: Ilm approaches an inverted dome, which triggers a new memorization challenge.

Fig. 52: Once the challenge is correctly completed, the dome flips to its proper position, and Ilm continues his journey.

CHALLENGE 1

Based on the 1980's electronic game, Simon Says, triangular tabs reveal words from targeted verses. The player follows the app's lead, tapping on the correct tabs in the correct order. Text is shown along with the audio. When the text disappears, the player tries to guess which tab the text and audio emerged from. This is then repeated, becoming increasingly difficult as the sequence gets longer, until the entire verse is memorized. This challenge fosters an engaging inter-action between player and app, involving registration and repetition. The longer the player can continue a randomized sequence (repetition), the stronger the registration will be (Fig. 53).

Fig. 53: Challenge 1. Text appears, along with audio, when the player enters the challenge.

CHALLENGE 2

Challenge 2 reinforces words memorized during the first challenge, but stresses their correct sequence. The words are shuffled and placed among other, unrelated words. The player links the words in the correct order, to form the verses. When there is an error, the words will not link, whereas a successful link forms the verse correctly and rewards the player with points.

وَلَسَوْفَ

وَاللَّيْلِ

١

سَجَى

فَهَدَى

وَوَجَدَكَ

٢

وَالضُّحَى

إِذَا

Fig. 54: Challenge 2. Players link words in the correct order to form verses, and then finish the link with the verse number, reinforcing the words, their correct order, and their associated verse.

CHALLENGE 3

Ilm moves through a maze, collecting words in the right order to form a verse. Chased by Nafs, however, Ilm has limited time to complete the task. This added pressure sharpens the player's ability to quickly recall the correct words in the correct order.

وَالضُّحَى

إِذَا

وَاللَّيْلِ

سَجَى

Fig. 55: Challenge 3. Pursued by Nafs, Ilm works his way through a maze, collecting words in the correct order to complete the verse.

Sil creates an interactive environment, with a system of triggers and reinforcements designed to make memorization more engaging and meaningful, and enjoyable. Here's an overview of the app and the conceptual framework implemented.

SIL
صـــل

MEANING:
LINK, CONNECT
(IMPERATIVE VERB)

Fig. 56: The logo and meaning of Sil.

CHARACTERS:

ILM

NAFS

MISSION:

ASSIST ILM TO RESTORE HIS LOST KINGOM BY COLLECTING RARE GEMS THAT WILL REVEAL THE ULTIMATE TREASURE. BATTLE THE DISRUPTIVE ENEMY (NAFS) ON YOUR JOURNEY. HE IS ON A MISSION TO ABORT YOUR PROGRESS.

GAME MECHANICS
(SET UP MECHANICS)

GAME-BASED PUZZLES, AS WELL AS OBSTACLES PUT FORTH BY NAFS RESULT IN AN ENGAGING & INTERACTIVE GAME DYNAMICS, KEEPING THE MEMORIZERS OF THE QUR'AN CHALLENGED, YET MOTIVATED.

Fig. 57: The characters, mission and game mechanics.

LINK

CREATE LINKS TO RESTORE
THE RUINS OF THE LOST
KINGDOM BY SOLVING
PUZZLES & OVERCOMING
OBSTACLES.

RE-LINK

RE-VISIT THE LINKS
BEFORE THEY ARE UN-LINKED
BY ILM'S ENEMY.

GAME MECHANICS
(OBJECTIVE BASED
RULE MECHANICS)

THE USER IS CONTINUALLY CHALLENGED
TO MOVE FORWARD, EARN POINTS
& COMBAT THE ENEMY TO RETAIN THEIR
SCORES. METHOD OF LOCI, CHUNKING &
SPACED REPETITION ALONG WITH GAME
MECHANICS FACILITATE AN ENGAGING
REGISTRATION & RECOLLECTION
PROCESS.

REVEAL

FORM LINKS, COLLECT
POINTS & RARE GEMS TO REVEAL
THE ULTIMATE TREASURE.

GAME MECHANICS
(PROGRESSION MECHANICS)

POINT SYSTEM, ACHIEVEMENT REWARDS,
& PROGRESS INDICATIOR GIVE THE USERS A
SENSE OF ACHIEVEMENT, & ENCOURAGEMENT
IN THE MEMORIZATION PROCESS.

IMMERSE

EXPLORE THE SURVIVING RUINS
OF THE LOST KINGDOM

AESTHETICS

ABSTRACT REPRESENTATIONS OF THE KEY
FEATURES OF MOSQUES AROUND THE
WORLD INSTILLS A SENSE OF CURIOSITY,
& BELONGING TO THE USER.
THIS IN TURN ASSISTS THE USER
TO CREATE FAMILIAR POINTS OF LOCI FOR
EASIER RETENTION & RECOLLECTION.

Fig. 58: Sil's game mechanics and aesthetic strategies. Players link and re-link, adding points during each step. In due time, accumulated points reveal rare gems. Gameplay takes place in an immersive digital environment inspired by features from mosques from around the world.

VIDEO STILLS FROM THE APP TRAILER

Following are the stills from the video trailer that was part of the thesis exhibition.

Fig. 59 and Fig. 60: Stills from the app trailer, depicting ideas of linking and connecting as various elements of the logo assemble together.

Fig. 61 and fig. 62: Introduction of the characters Ilm and Nafs, and a description of each character's mission.
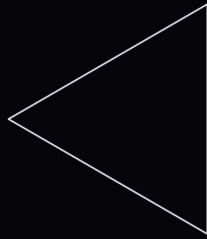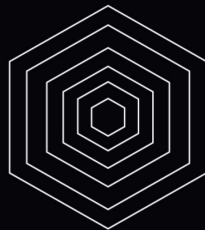
Fig. 63 and Fig. 64: Gameplay features within Sil.
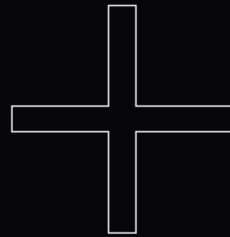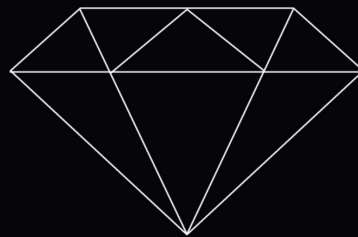
Fig. 65 and Fig. 66: Gameplay features within Sil.
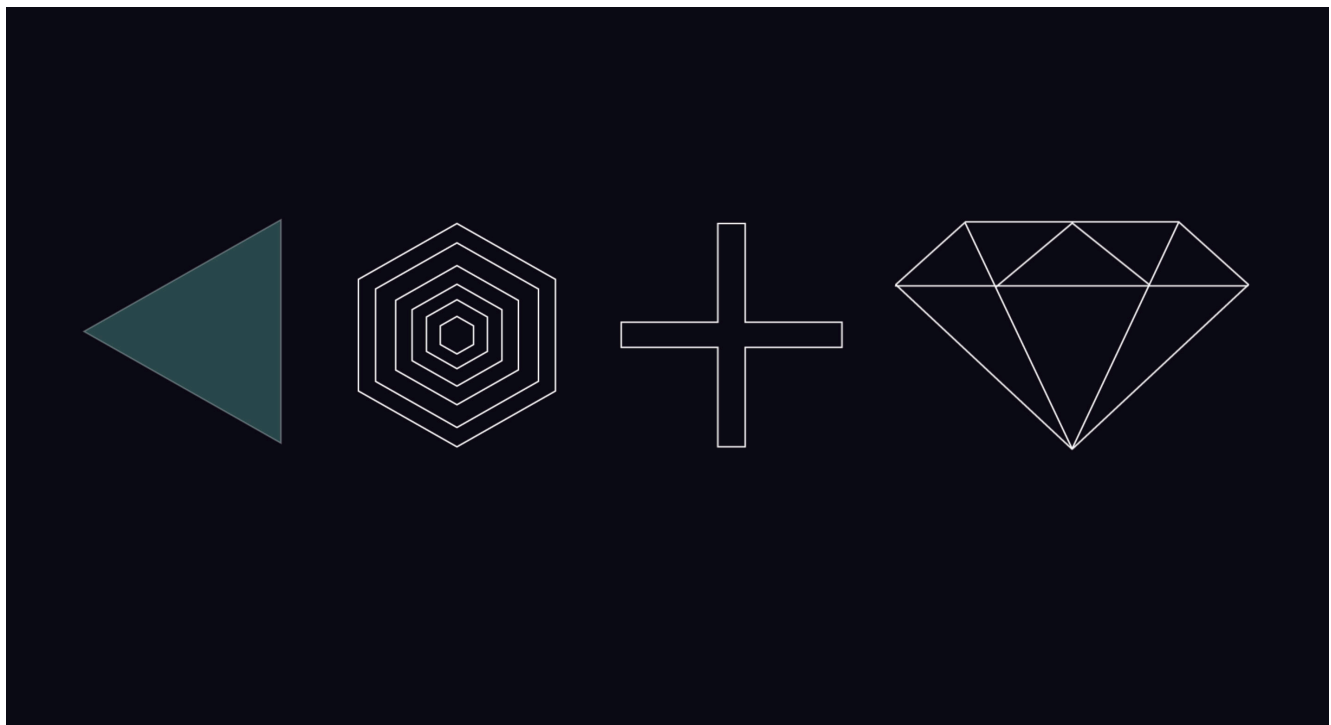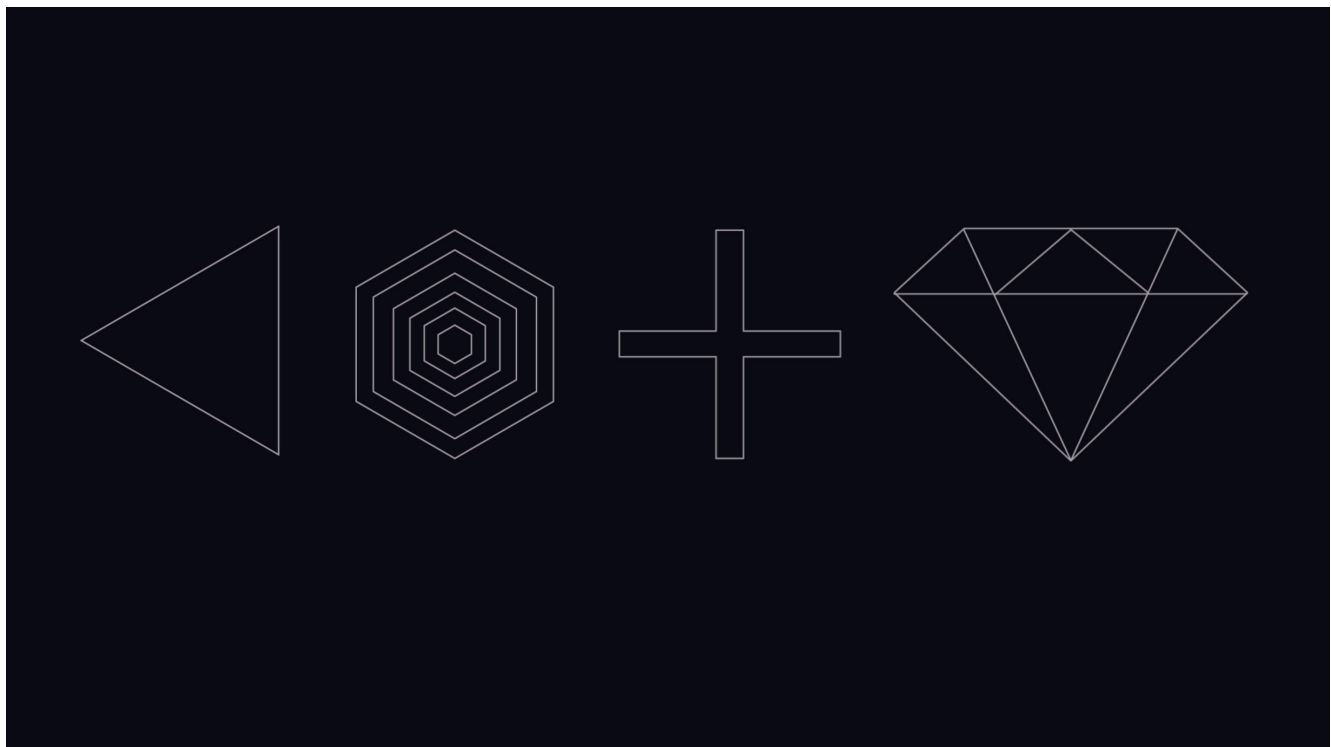
Fig. 67: Gameplay features as icons, which become recognizable to players with repeated use. Icons allow players to easily check progress during gameplay.

Fig. 68. and 69: The player builds palaces, components of Ilm's kingdom. A hexagonal diagram serves as an index of the Qur'an, used to orient players and give a sense of the task at hand.
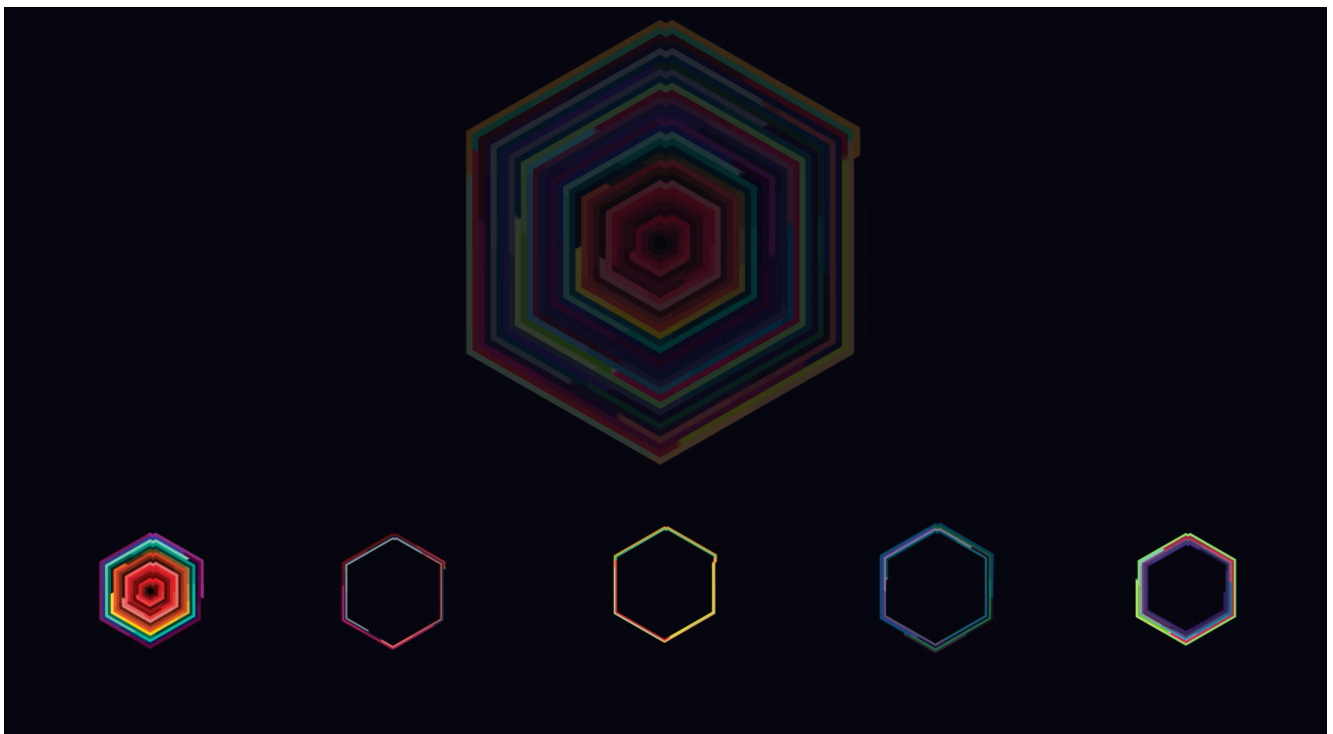
Fig. 70. and 71: The diagram (kingdom) breaks down into its component parts (palaces).
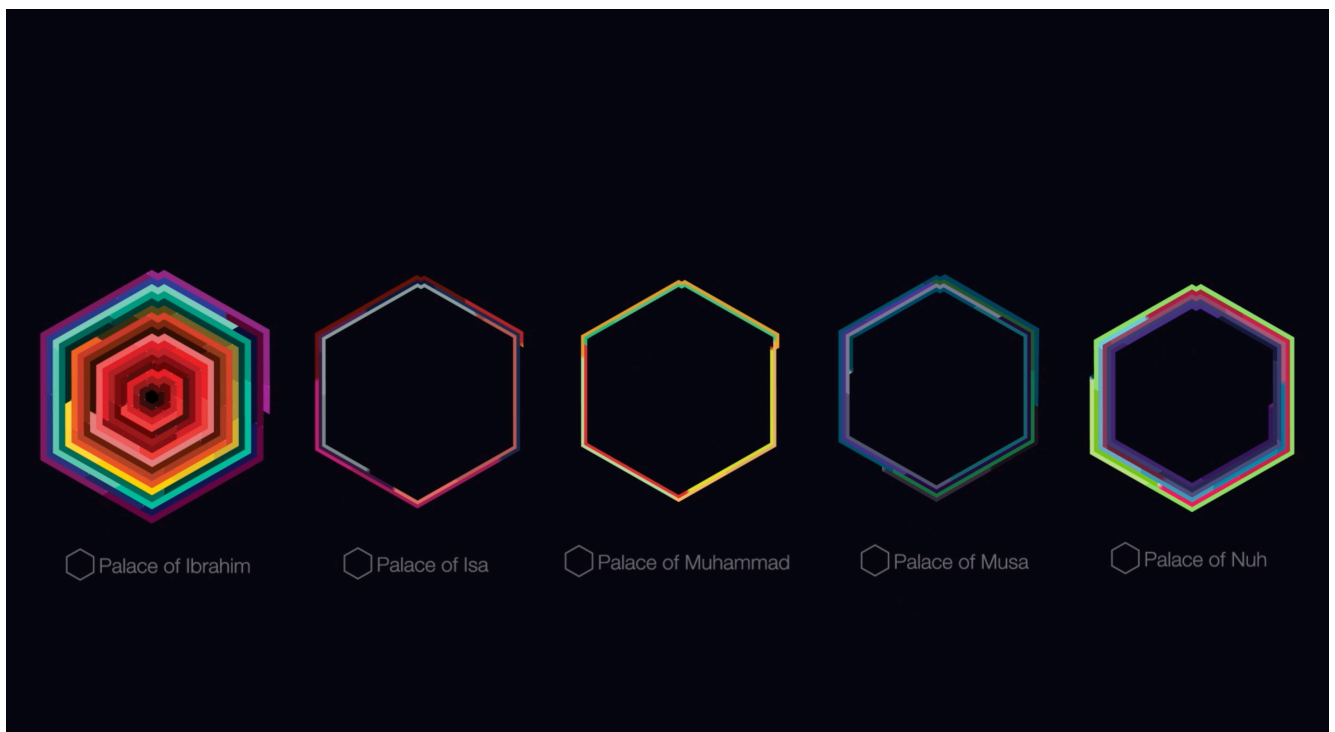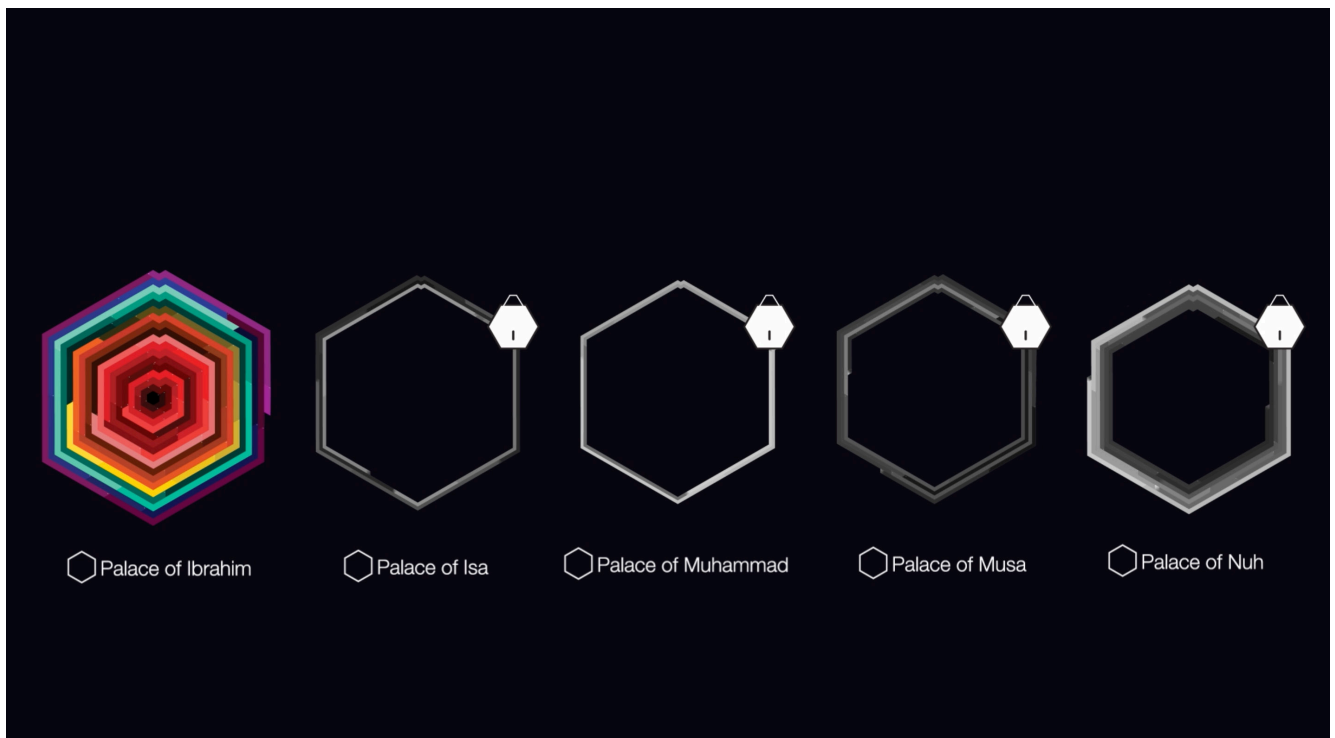
Fig. 72 and Fig. 73: The five palaces of Ilm's kingdom. The first palace is highlighted, while remaining palaces are in grayscale, locked until the player makes enough progress to access each in sequence. The palaces are named after the five messengers mentioned in the Qur'an. The structure of the Qur'an is thus divided into six Juz per palace, the total amounting to 30 Juz. Content from the Qur'an and the Islamic religion inspired game elements such as the points reward system, rare gems, characters, and palaces.
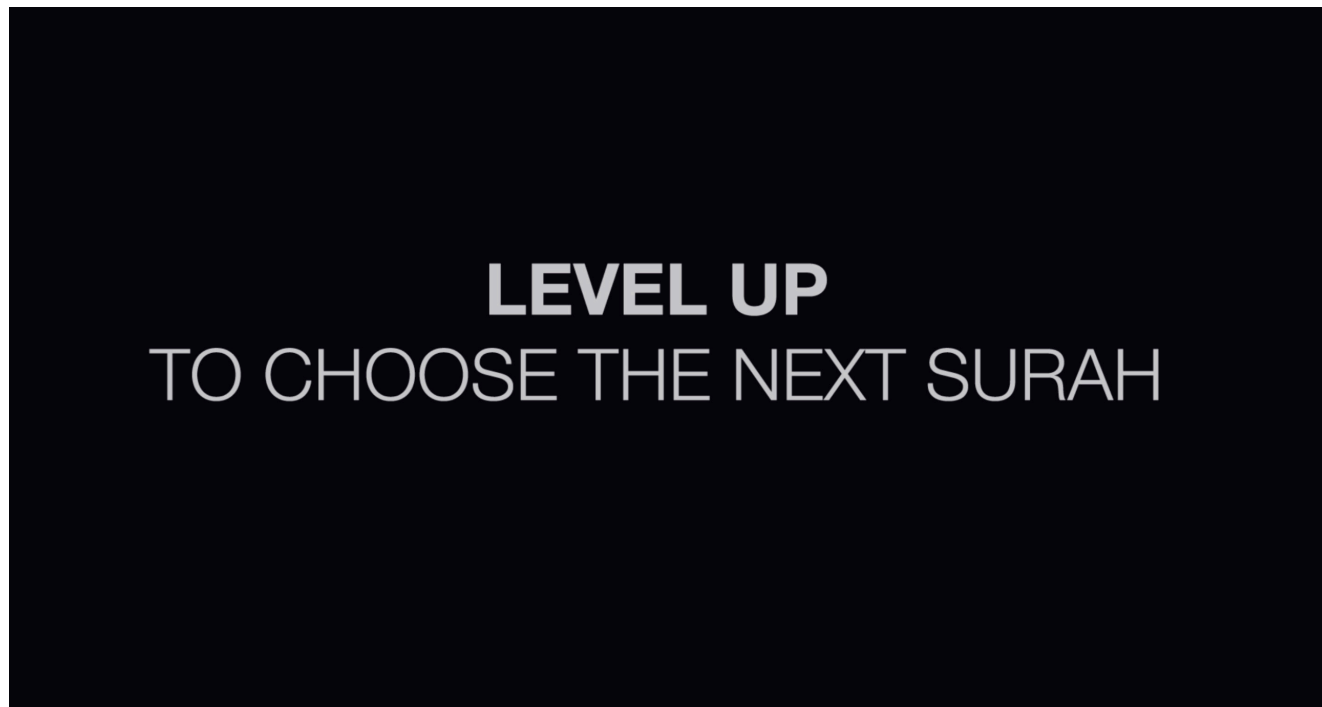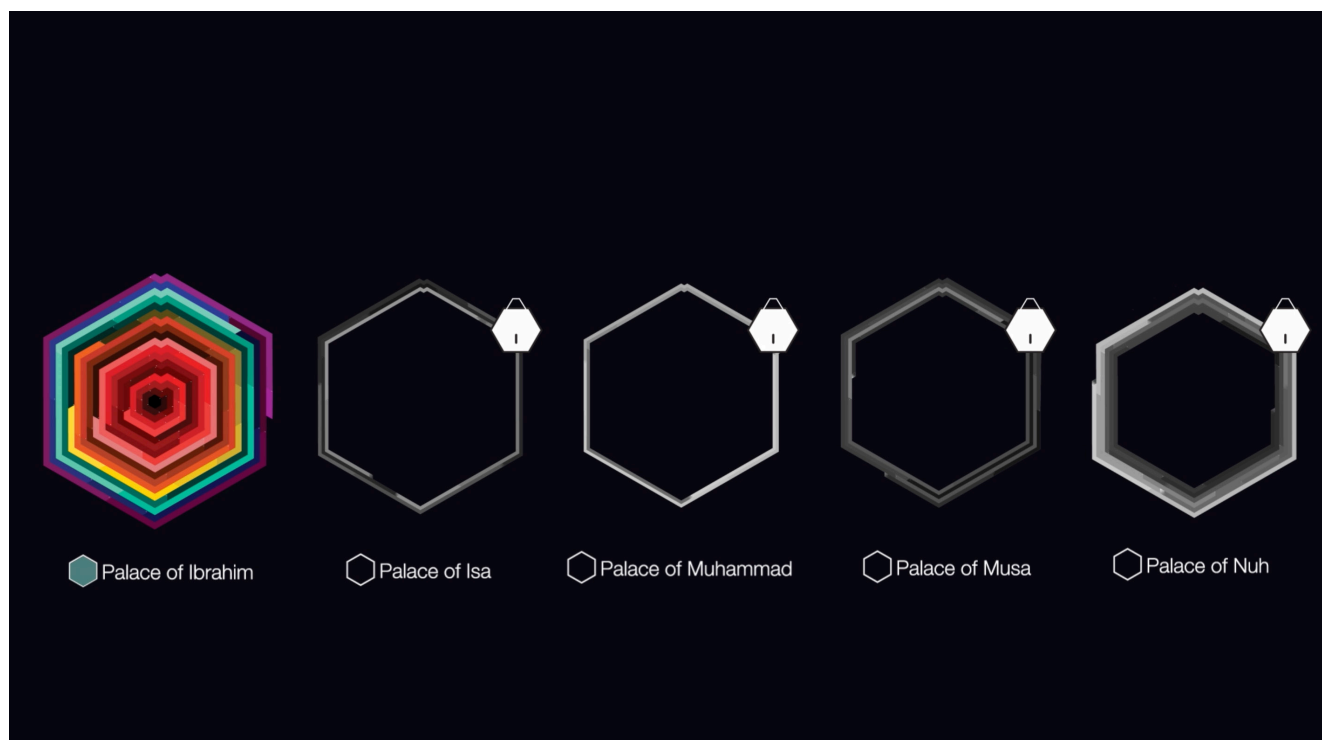
Fig. 75 and Fig. 76: The player begins with the Palace of Ibrahim, and the app prompts him/her to select a Surah to memorize. Upon satisfactory completion, the player can select the next Surah and advance.
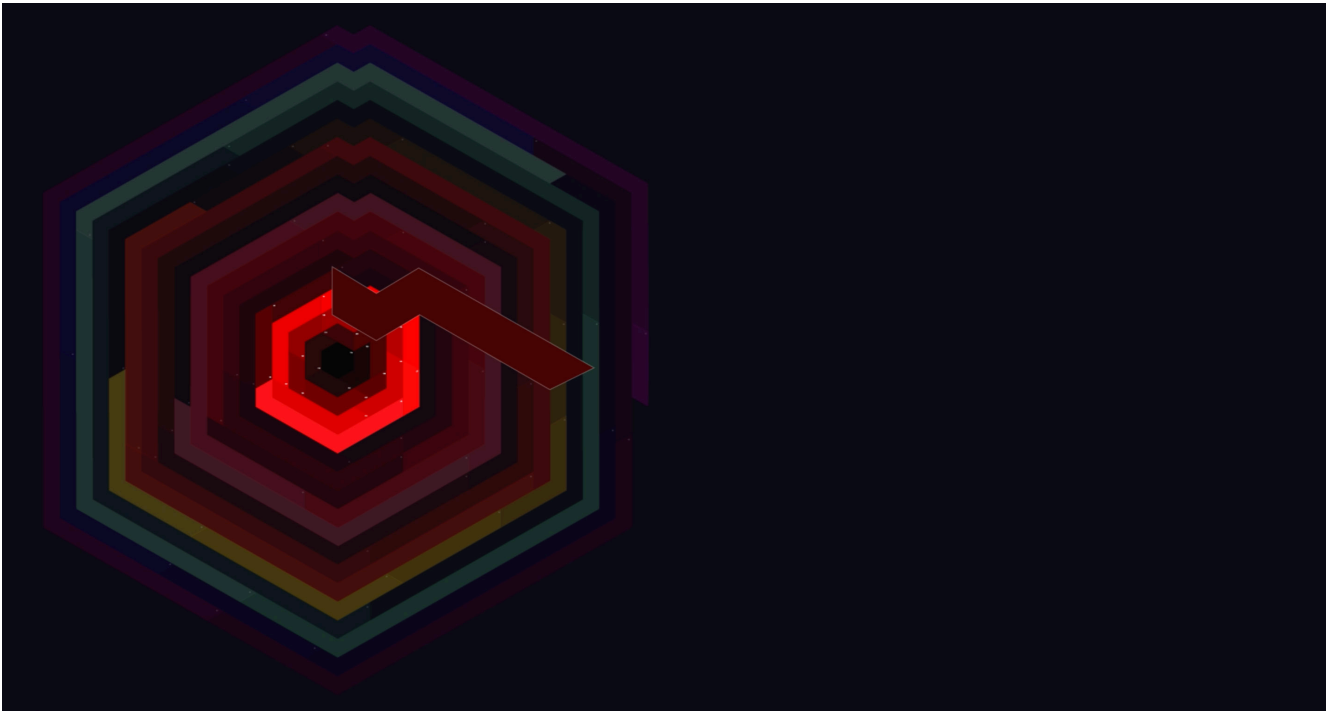
Fig. 73: The player selects the Surah to memorize.
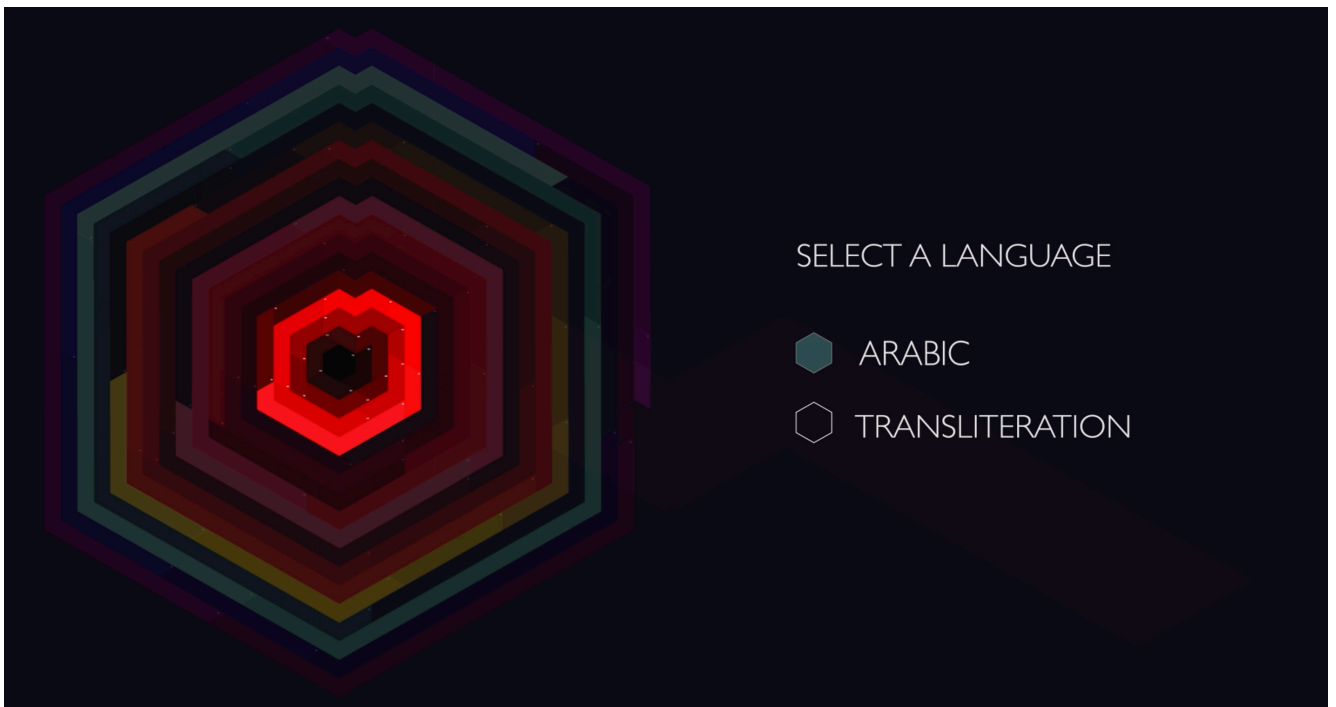

SELECT A LANGUAGE

ARABIC

TRANSLITERATION

Fig. 77: The player can select text in Arabic, or transliteration.

Fig. 78: After selecting the Surah, players are provided with information beneficial to the process of memorization. Players can choose to attempt one or more verses, but no more than three. The limit of three verses prevents a player from forming weak links and poor registration of verses. This method, called chunking, is used to break down large amounts of content into smaller, more manageable bites. This particular Surah (Surah Ad-Duha, Chapter 93) contains eleven short verses, grouped into smaller parts as follows: 2 + 3 + 3 + 3.

Fig. 79: Once the player selects the verses, , a screen comes up with keywords that summarize the Surah's content.
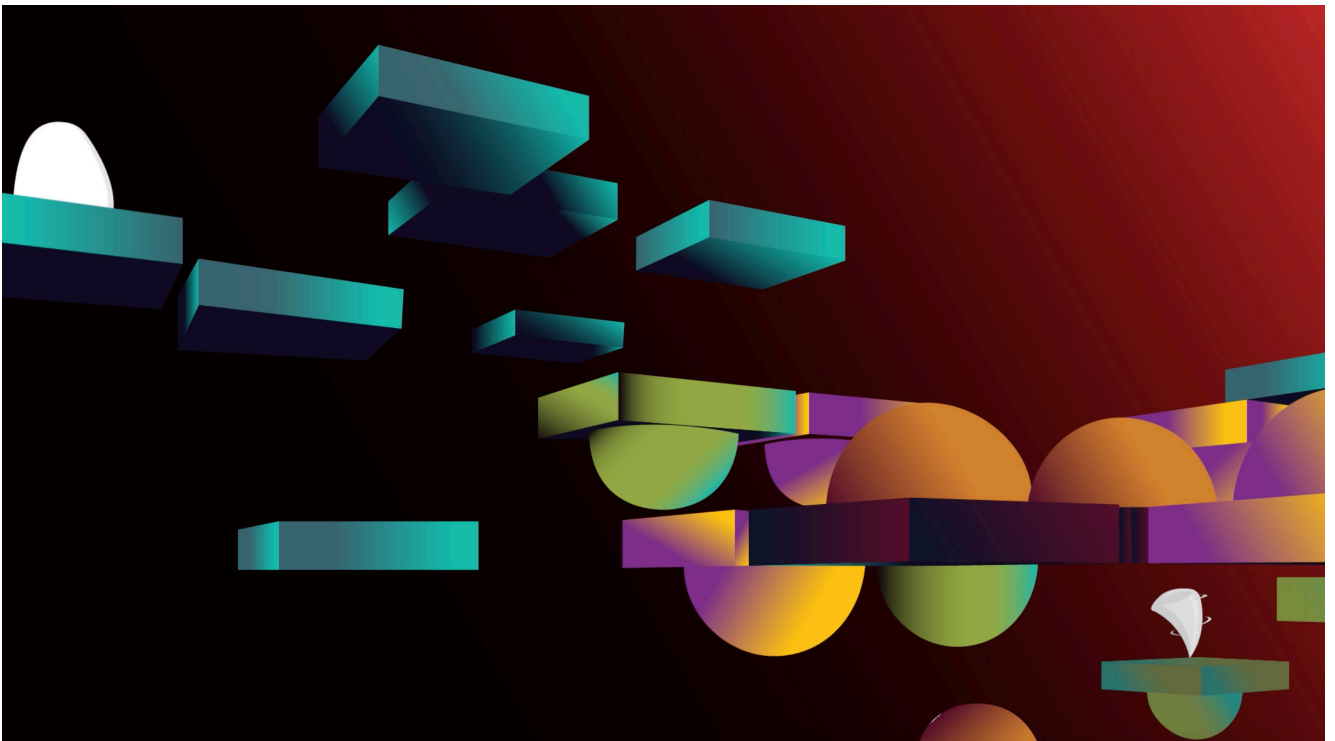
Fig. 80. and Fig. 81: The player then enters an abstract digital world inspired by mosques from around the world. Distinct features from these mosques create visual cues for the player, generating memory loci. These memory loci, in turn, help players retrieve information. Players aid Ilm on his journey to restore his lost kingdom by connecting and linking pieces dispersed in space, and by avoiding Nafs. Sil helps players learn, explore, and memorize, by using interactive and engaging challenges, alleviating the pressure and drudgery of the traditional memorization process.
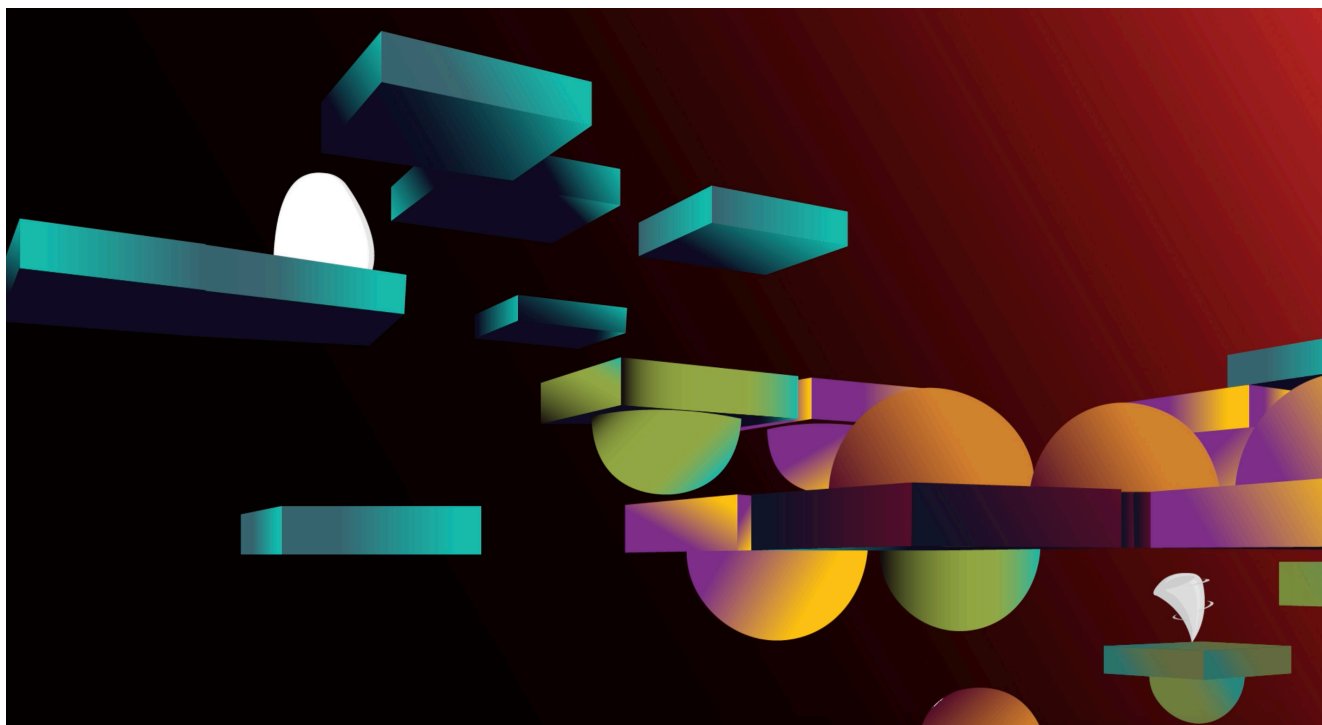
REGISTER, REPEAT & RECALL
USING GAME-BASED LEARNING

Fig. 82. and Fig. 83: Once two pieces are connected, llm advances along the path, prompting the user to connect the next piece, and so on. This sequence provides constant interaction, mental challenge, and keeps users engaged and motivated. llm's progress provides players with a sense of accomplishment along the way.
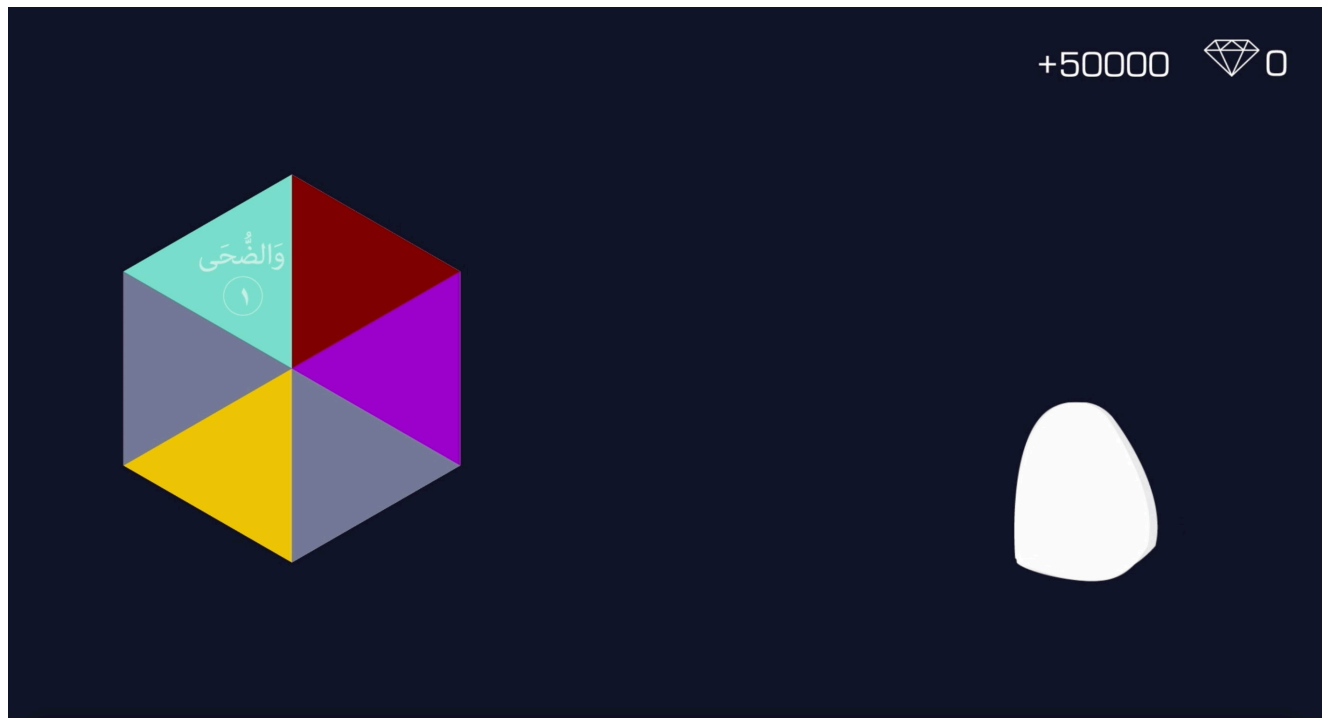
Fig. 84: This challenge, as explained earlier, reinforces specific words from the Qur'an, requiring the player to to repeat the words in a specific sequence. Players earns points for correct responses, with more points awarded for correctly following longer sequences.
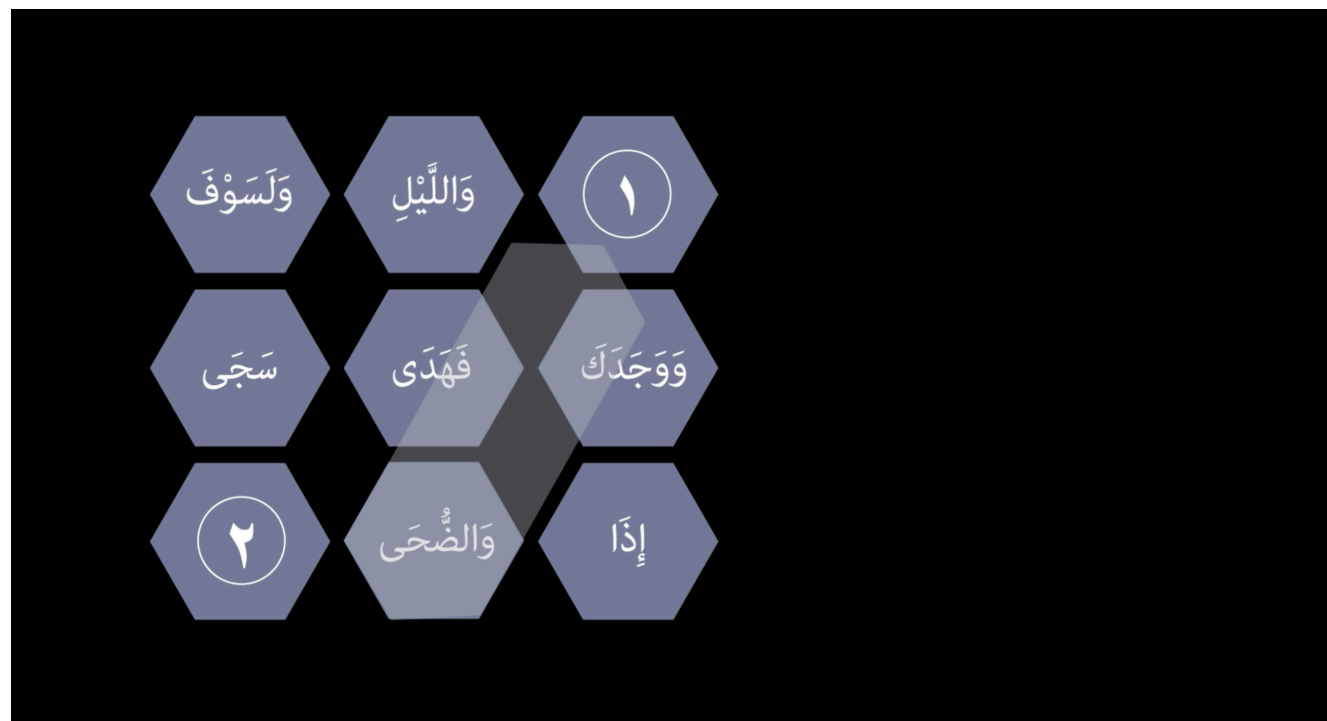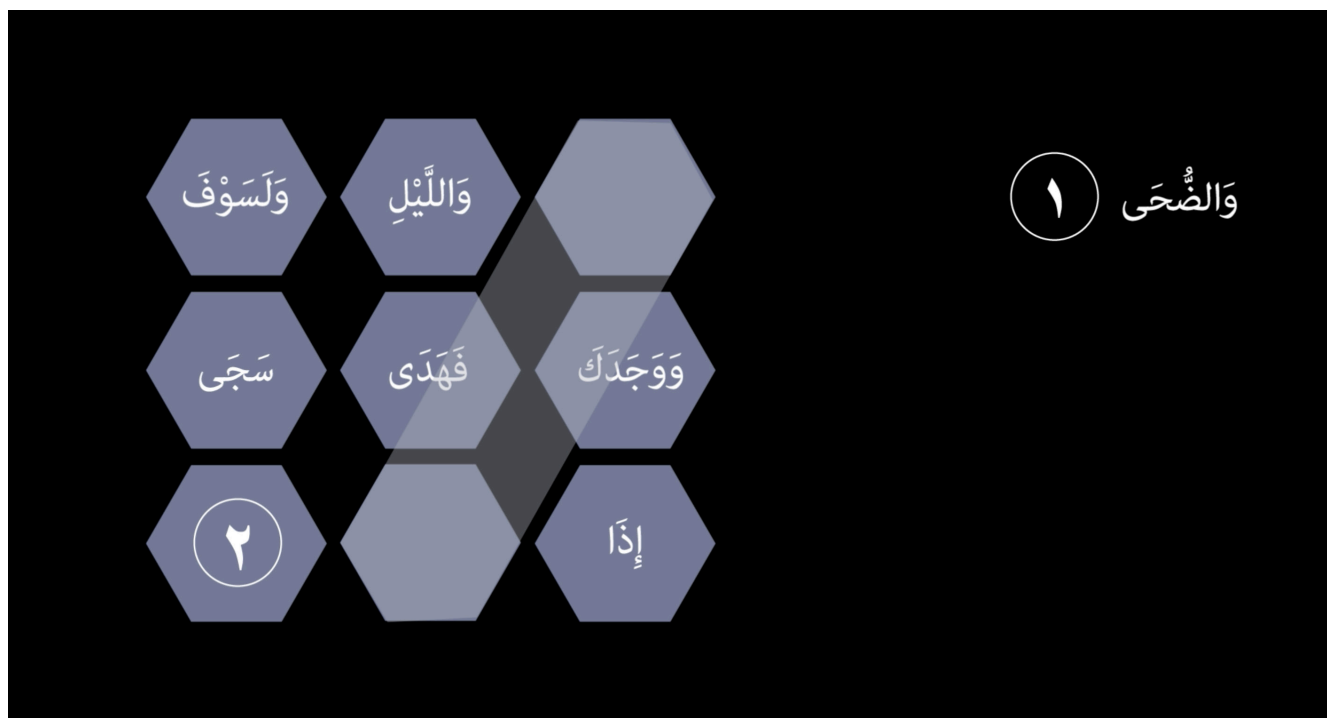
Fig. 85. and fig. 86: The player connects words according to the order of their placement in the verse, and finishes the link with the correct verse number. Once the verse is completed, it moves to the right, allowing the player to see his progress. An incorrect sequence will not link together, prompting players to keep trying. Once a player connects all of the verses, he can move forward with Ilm.

Fig. 87 & fig. 88: Within the digital environment of each Surah, a unique arrangement of features helps cue the player's memory. In the particular Surah featured in the app trailer, the dome is the distinctive feature.

COLLECT THE WORDS
IN THE RIGHT ORDER

Fig. 89: The player guides Ilm to collect the words of the verses in the right order, while working to stay ahead of his nemesis, Nafs. If Nafs catches Ilm, the player must start over.

Fig. 90: Once collected, the words appear on the right side, to show progress.

Fig. 91. and fig. 92: The dome flips to its proper orientation, once the player solves each challenge. Then, Ilm can continue his journey.

Fig. 00n: At the end of each memorization session, a link forms between selected verses.
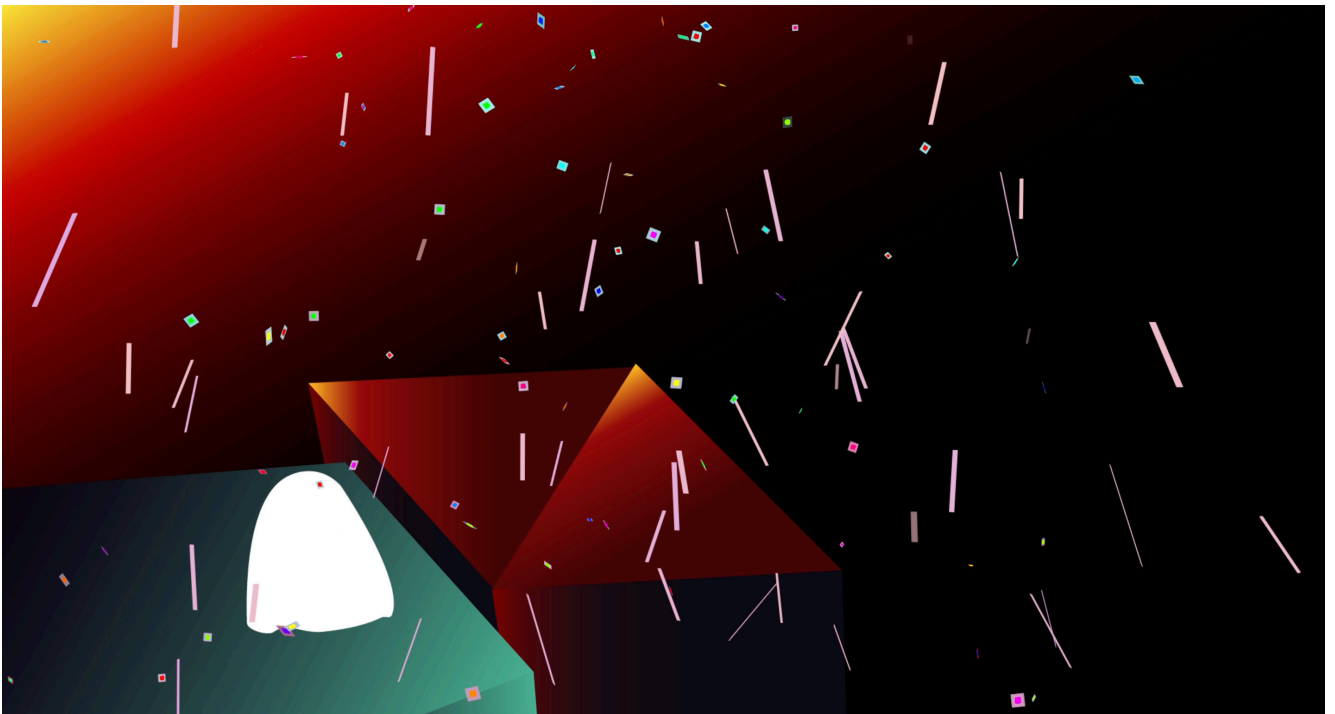

Fig. 93: As the verses link, the player gains points, and earns a celebration. Small incremental celebrations motivate the player to continue with the game, and achieve more.
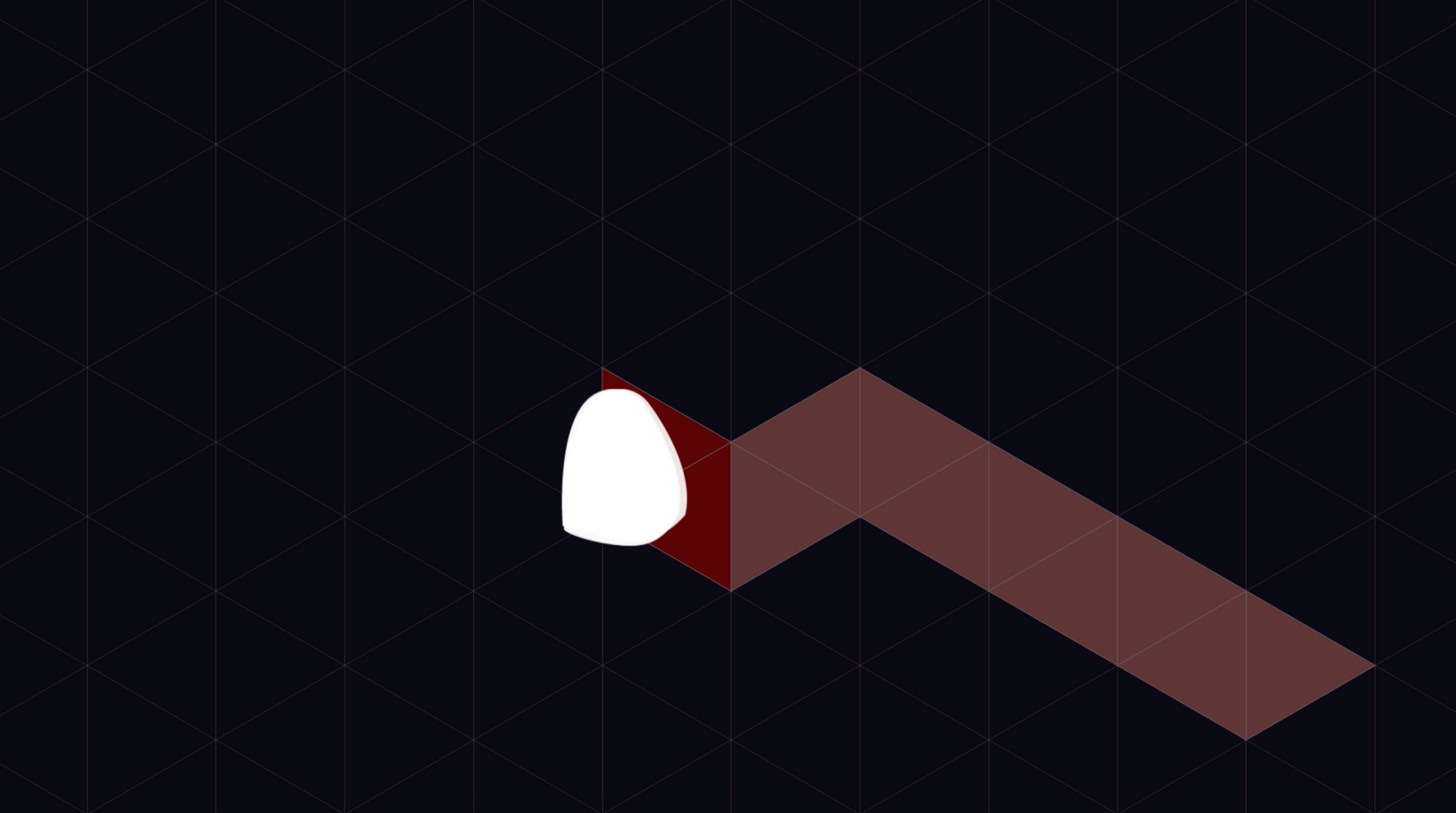
Fig. 94: Memorized verses are filled with the shade of the particular Surah, indicating progress, and providing a visual motivation, giving the player a sense, at a glance, of how much remains before upgrading to the next level.
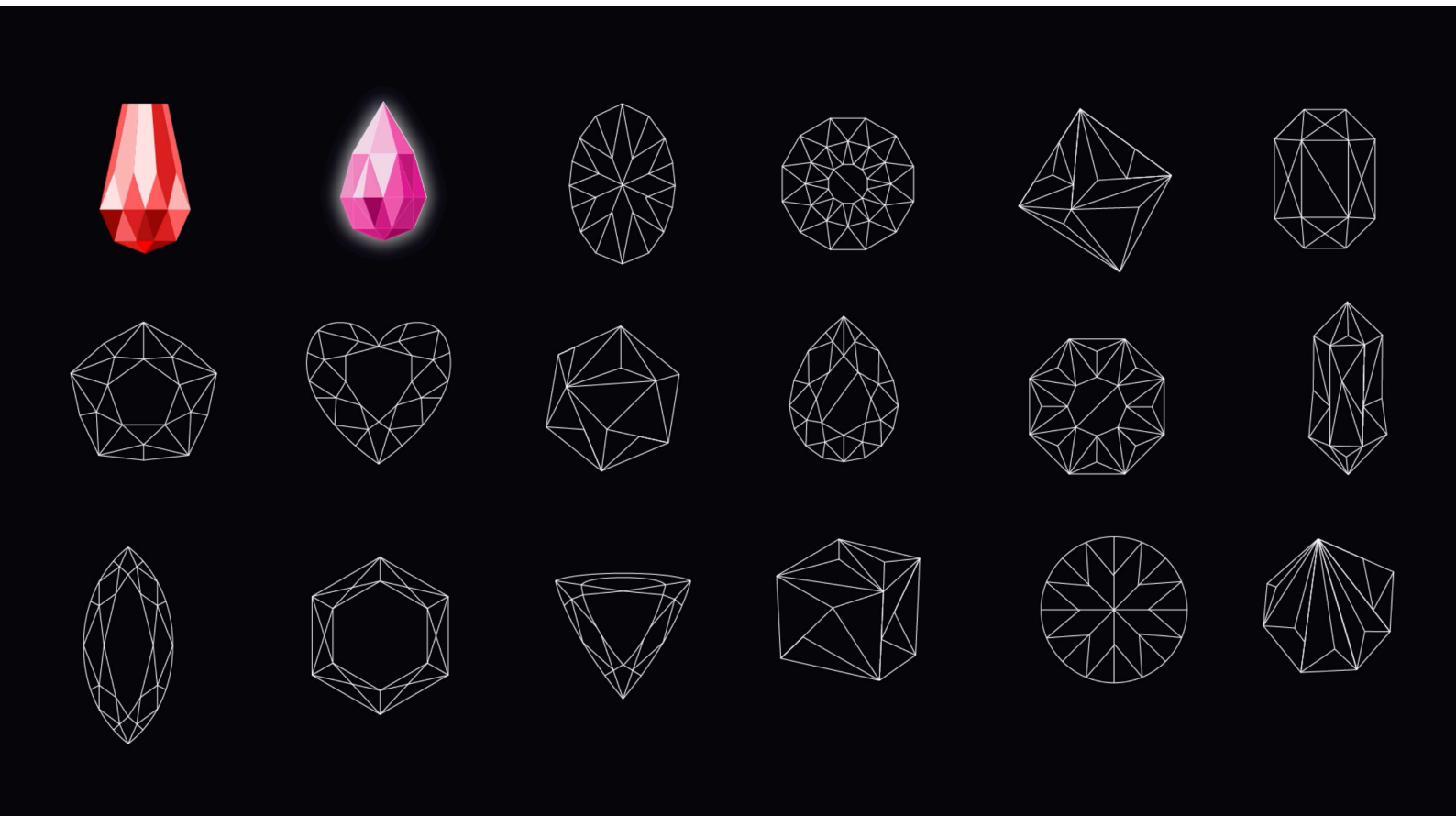

Fig. 95: An overview of rare gems that players collect with each increment of 100,000 points. Each gem is unique. A full set, while difficult to attain, reflects the ultimate goal of memorizing the entire Qur'an: a profound accomplishment.

11

conclusion

This research synthesized game design elements and memorization techniques during the design of Sil: an interactive app, that will help people memorize the Qur'an in a more engaging way. The multi-dimensional research answered questions I've considered for a long time; questions that will continue to challenge and motivate me toward further research. I fully intend to initiate more interdisciplinary collaborations and discussions, to build upon what I've accomplished here, and take it forward in the years ahead. By outlining the delimitations of this research, I have taken the first steps toward synthesizing game design strategies and proven memorization techniques, to focus them on the task of Qur'an memorizion.Additionally, the research framework could be developed to combine digital and analogue functions. One possibility might be to develop a PS4 video game to create a more immersive and interactive learning experience. The research framework could also be adjusted for further research to achieve different results, or adapted to address a different problem. The growing availability and popularity of Virtual Reality platforms could also provide a future direction for the development of Sil. Research questions raised earlier in the process still linger:

How can we foster passion for the Qur'an and its many lessons, among generations raised in the digital era? How do we make the memorization process more pleasurable and less monotonous?

While designing a tool for a more engaging Qur'an memorization process, we need to consider:
Who will use it?
Who else, besides the user, will be impacted, and how?
What does the success scenario look like?
How is the tool different from processes available today?

Maintaining focus on these straightforward but significant questions, will lead to more satisfying solutions, tools and processes, designed to address the needs of current and future generations.

REFLECTIONS

Undertaking research on a topic involving the Qur'an was inherently complex and intimidating. I challenged myself to focus on the design process and narrow the scope of external considerations. This research only just begins to address questions related to the task of designing effective learning tools for digital natives. Throughout my research process, strangers, friends and colleagues reacted positively to the research, eager for the learning tools it promises to deliver. During my thesis research I have encountered a real thirst for cross-disciplinary dialogue, a deep desire for collaboration between scholars and designers, throughout the design process. This becomes especially apparent working around a complex subject like the Qur'an. The Qur'an is a religious text, which must be handled with great care and sensitivity. I was very careful not to introduce anything that could be construed as out of step with the values of the Qur'an. The complexity of the Qur'an--from its layered meanings, to its underlying structure, to the ways it is interpreted--can easily overwhelm a layperson like myself. One clear challenge identified by my research process is the need for more direct conversations between Qur'anic scholars and designers.

Islamic scholars are beginning to realize the differences associated with digital natives, their habits, learning styles, and expectations. Conversations I had during my research provided anecdotal evidence that some leaders are realizing the broader issues within the education system, identified by Prensky. However, adjustments in the religious community are happening at a very slow pace, resulting in disaffection for a large number of digital natives, who are distracted by the flash and glitter of the digital era. The result is a generation of individuals with only superficial links to the Qur'an and its lessons. More collaboration and exchange are vital, to facilitate efficient research processes, and generate satisfying, well-designed solutions more in step with the needs of people. Design research related to the Qur'an is years behind, considering today's powerful technology. To speed up the process, and to generate better outcomes, suited to the needs of the younger generations, it is vital to facilitate exchange and dialogue between interdisciplinary designers, educators, scholars, and technological experts.

This thesis allowed me to approach Qur'an memorization from the perspective of digital natives, but it also allowed me to discover, analyze, and synthesize information that touched me spiritually. It has been a gift to spend time pouring over, reading, analyzing, and pondering the Qur'an during the course of my research. I realize it is an experience we must strive to share with digital natives, so they can also benefit from an immersive experience with the Qur'an--on their terms--so they also can benefit from a stronger link with God.

FUTURE DIRECTIONS

Sil envisions gameplay in a single player mode. It will be worthwhile to explore Qur'an memorization from a multiplayer perspective, with multiple players helping each other to memorize, motivate, and recollect, while pursuing the higher goal of meaningful engagement with the Qur'an. The memorization process benefits from persistent motivation and encouragement, as well as support from family, friends, and peers[i]. A multiplayer platform would help provide this support network.

Sil is currently designed for a digital mobile platform. In future I also wish to explore the relative benefits of analogue games, in addition to advantages offered by mixing both. Throughout my research process, I was fascinated by possibilities of using various media for facilitating the memorization process in a playful, engaging, interactive manner.I fully intend to continue to explore the topic through further research, reading, making, and reflection. At one point, I intended to diagram the Qur'an's structure in the form of physical blocks. Ultimately, due to the scale of the task, I decided to focus on making a digital tool; a more achievable goal, given the available time frame. During my research, I came across games and puzzles that were mixed reality. Physical reality and virtual reality combined. The combination intrigues me, as a future possibility.

My favorite example in this area is KOSKI.

KOSKI

KOSKI is a board game that connects the physical and digital gaming worlds together in a new, unusual and playful way. It is a combination of real toy blocks and a virtual app that evokes digital interactive game-play. The player uses an iPad as a "magical mirror" to view physical wooden blocks. By using augmented reality and object recognition, as the player builds, and interacts with the blocks, the game reveals hidden worlds, characters, and stories. It unlocks new and imaginative ways to play.

Fig. 96, 97 and 98: KOSKI components and mixed-reality play

Games and game systems like KOSKI interest me due to their inherent appeal to players of all ages, and across cultures. This phenomenon resonates with the Qur'an, which is learned, explored, and reflected upon by millions of people, across generations, nationalities, and cultures.

Virtual reality, augmented reality, and a combination of physical, virtual and augmented realities are important future trends. A famous, and enormously popular example is Pokémon Go. In order to design tools for education and efficient learning, educators, designers, engineers, researchers, and scholars need to think outside the box and ahead of the curve.

Marc Prenksy offers wise words we must consider:
…educators know something is wrong, because they are not reaching their Digital Native students as well as they reached students in the past. So they face an important choice.
On the one hand, they can choose to ignore their eyes, ears, and intuition, pretend the Digital Native/ Digital Immigrant issue does not exist, and continue to use their suddenly much less effective traditional methods until they retire and the Digital Natives take over. Or they can choose instead to accept the fact that they have become Immigrants into a new Digital world, and to look to their own creativity, their Digital Native students, their sympathetic administrators and other sources to help them communicate their still-valuable knowledge and wisdom in that world's new language. The route they ultimately choose—and the education of their Digital Native students—depends very much on us.[49]

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[48] Prensky.