Exhibition as Component of:

iSquare Project
Scholars-in-Residence Program
Jackman Humanities Institute
University of Toronto

May 26 2017 | **JHI EXHIBITION**

Introduction

What is information? How is information perceived?
Where does information exist? Is information alike to everyone?

The Faculty of Information at the University of Toronto aims to answer these questions and capture the nature of information, through a form of analysis that spans beyond words.

The arts, including drawing and colouring, often allows people to express themselves in ways that are more compelling and wide-ranging than writing. Building upon this concept, Professor Jenna Hartel, the iSquare research team, and the Fellows from the Jackman Humanities Institute Scholars-in-Residence program, employ an empirical, visual method known as the draw-and-write technique to conduct arts-informed research.

Arts-informed research is used to qualitatively investigate the nature of information. Through the amalgamation of literary, graphic, and colour-infused content, the iSquare project hopes to gain rich and deep insights into the perception of information, and reach diverse audiences through the universal language of art. Meshing this fluid quality of art to the systematic and rigid methods of research is a challenge the iSquare team has taken on, as they have employed five original analytical approaches to evaluate the data set. Through these lenses, the team prospects to bring information science to the visual Information Age and create a resonant multimedia genealogy that turns information into meaning.

Introducing the iSquare Team

Dr. Jenna Hartel, Principal Investigator

Professor Jenna Hartel is the Associate Professor in the Faculty of Information at the University of Toronto. Her empirical research is organised around understanding the nature of information. She is the principle investigator of the iSquare Team and provides ultimate supervision for her undergraduate junior scholars participating in the month-long Jackman Humanities Institute Scholars-in-Residence program.

Christie Oh, Project Manager for Pedagogy

Christie Oh is the Project Manager within the iSquare Team whose concentration on pedagogy assisted her in organising and scheduling a creative and motivating project timeline for the JHI fellows that provided space for them to grow and expand as individuals as well as bringing progressive energy into the project. She presented critical insight into visual analysis presentations and pushed for different methods of learning that would help the JHI fellows to gain experience and expand through the process.

Stephanie Power, Research and Data Manager

Stephanie Power is the Data Manager within the iSquare Team, managing and preserving the accumulated data of their research in multiple locations, both digitally and physically. During the month of the Jackman Humanities Institute Scholars-in-Residence program, she presented a series of workshops to the JHI fellows on data management, preservation and eventually guiding the JHI fellows towards preserving the data from their month-long research in databases and online platforms.

Rebecca Noone, Artist-in-Residence

Rebecca Noone is the Artist-in-Residence within the iSquare Team, playing an important role in researched relying on arts-informed methodologies. Throughout the month, Rebecca not only provided the JHI undergraduate fellows with knowledge regarding visual analysis of the collected iSquares, but also informed the JHI undergraduate fellows on accessibility awareness in exhibition design and setup for their final JHiSquare exhibition.

Jackman Humanities Institute Scholars-in-Residence (Intro)

Mahika Phutane

Double Major: Computer Science, Communication, Culture, Infomation & Technology (CCIT)

An honest, yet a caring and passionate student that loves all things artistic. My double major in Computer Science and CCIT @UofT helps me explore the artistic spectrum from creative thinking to creative expression, in newer and more accessible ways. My ambition lies in the statement: I do art, not to escape reality, but simply to understand it better.

Sicily Shi
Specialist: Psychology
Despite the three years of "suffering" at University of Toronto, I am still deeply in love with Psychology. Why? I don't know. It's always hard to figure out what is really going on in one's mind, and perhaps that's what makes Psychology so fascinating to me!

Stephanie Posa
Double Major: Psychology and Art History
I have recently completed my third year at the University of Toronto, where I am pursuing a degree in Art History and Psychology. Being part of the iSquare team this month has been profoundly exciting, as it has granted me an opportunity to explore my interests in human cognition and the communicative power of visual expression.

Annie Xu
Double Major: Art History and History
Your typical university student who is a little idealistic and wants to travel and read. I am passionate about typography, critiquing subway advertisements and deconstructing visual signals. I enjoy graphic design, and as a long-term goal, hopes to make information, especially academic publications more accessible and engaging through visual means.

Sydney Bradshaw
Major: Cinema Studies Minors: Book & Media Studies, Creative Expression & Society
A photographer and writer interested in how people express what it is to be human. I like stories, small animals, and exploring the relationship between the arts and technology.

Site of Production
Revisiting how the coloured iSquares were created.
This site aims to recreate the environment that all participants experienced during data collection, and to reveal some field observations from the JHiSquare team to the audience. The brown paper tablecloth, colour pens and 8" x 8" squared paper are the original materials that participants used in the study. The handwritten texts on the other side of the table are the fieldnotes that the JHiSquare team had taken during the data gathering session.

Together, this site brings people back to the day when the colored iSqaures were first created and then collected.

Site of the Image
This visual network situates each of the 39 JHiSquares within an analytical spectrum that progresses from positivist to interpretivist frameworks.

This site is comprised of 39 JHiSquares created by the 39 JHI Scholars-in-Residence who participated in our data collection. The arrangement of this display is dictated by an organizational scheme that places each JHiSquare into one, or multiple sites of analysis. The resulting horizontal network that is displayed is representative of an analytical spectrum, which progresses from positivist to interpretivist frameworks, that were used to evaluate the data set.

A legend, featuring brief explanations of each of the five analytical approaches is provided to help guide viewers, visually, through this display of JHiSquares. Of all the analytical approaches, Formal Analysis stands as the quintessential positivist method used to strictly evaluate the formal elements of the iSquares such as line, shape, and colour. As the horizontal spectrum evolves, holistic techniques that abide by interpretivist frameworks were employed to add additional layers of social, cultural, and psychological meaning to our data set.

The two silver lines seen emerging from behind the drawings, forms the shape of a horizontal pyramid that begins with a pointed tip, and broadens into a widening frame. In this way, the triangular shape stands as a visual counterpart to representing the broadening of analytical techniques that were used to evaluate and give meaning to the JHiSquares corpus.

Emerging from, and spanning between the JHiSquares are lines of coloured string. These visual connections are strategically placed and arranged using strings that chromatically correspond to the range of colours associated with each method of analysis. With this approach, the coloured string attached to a given JHiSquare reveals the method of visual analysis primarily used to assess it. While certain JHiSquares are exclusively associated with a single colour of string, implying that analysis most effectively occurs using a single framework, others may

host a multitude of coloured strings that are associated with various positivist and interpretivist analytical strategies.

Methods of Analysis

Formal Analysis [Xu]

Formalism observes the most fundamental elements of a given object, such as the line, shape, colour, texture, and composition, and studies the relationship between these elements exclusively. The relationships are often analysed from the differences in space, density and width and direction. They will produce values of movement, balance, harmony, and emphasis. Specifically, it is the relationships between these basic elements that generate what we observe as a dark atmosphere, speed, an area of focus and a general impression of the object we see.

The technique, formal analysis, comes from this intellectual framework of Formalism, developed and popularised by art critics such as Clement Greenberg and Michael Fried, during the modernist art movements such as Abstract Expressionism and Minimalism (Pooke, 2008). Formal analysis is an essential technique used extensively in the discipline of art history. The learning of this method is mandatory in all introductory art history university courses. In the same way, studies in formalism are also foundational to introductory design courses, as the understanding of this technique can help designers and artists increase the impact of their work.

The iSquare project integrates art-informed research methods into its analysis of the collected data. Formal analysis can bring insight into the messages the participant is trying to convey, whether intentional or not, and with or without social context. General values, priorities and focuses can be easily identified through this method. As a positivist method, trends and facts can be extracted that will be difficult to question or overturn. Nonetheless, in order to understand the reason for such values, an interpretivist approach must be applied for deeper comprehension into the cultural and social implications.

E.g. If given an image of a person, rather than trying to understand the culture construct of the person, formal analysis focuses on the position of the person in the composition and how the person's posture leads the viewer's eye across the composition to inform the researcher on what values the character is trying to emphasize.

Inductive Visual and Conceptual Analysis [Bradshaw]
I started off by looking over the iSquares, paying attention to any patterns that jumped out at me. I also noted any instances in which I saw common themes between different squares. Though I didn't have an initial framework in mind, I found myself piecing together a system of categorization based on the thematic content I found within the images. My methodology proved to be a hybrid of Buckland's conceptual analysis, thematic analysis and a bit of content analysis to provide structure to my discoveries.

Overall, I found that looking at the squares before setting up a stringent system to organize them with allowed me to think outside the box and approach interpretations of the squares that I wouldn't necessarily have made under a rigid system.

Quantitative Analysis:
Developed tangible vs intangible and then more subcategories; inspired by conceptual analysis (information-as-thing, etc.)

Intangible: information as a metaphor, a concept, an abstraction, etc.
Tangible: information as an object / multiple objects, a system

From there, I could look at each individual square and find the best approximation of what I thought it was trying to say about information, aided by the text on the reverse side. I also thought about the use of colour, making note of the uses of colour in objects especially and how said colour compared to real-life colourings of the same object (eg JHI-018 uses mostly true to life colouring, whereas JHI-001 is far more colourful in its interpretations).

Information (12), Knowledge (9), World (6), Us (6), You (5), Web (5), Think (5), Perception (5), Different (5)
Of course, there were some outliers that didn't quite fit into either category, namely, squares that were made entirely of text (eg JHI-014). I also realized that it would be entirely possible for any of my interpretations to be extremely subjective and based on my own experiences and understandings of visual/textual culture.

I also decided to gain some context on the images by looking over the

demographic information on the back of the iSquares. As I did this, I noticed several words that appeared multiple times. I ran a 'Word Frequency Counter' on the excel document that we used to store said information and outlined below the words that appeared 5 or more times in our group of 39 drawings:

Of course, this is not an exhaustive list and there were words that also appeared 2, 3, and 4 times that would be interesting to investigate in the context of the drawing associated with each.

A Thematic Analysis of Technology [Phutane]

In many of the iSquares, nuances of technology were noticeable and it formed the question- how are people perceiving the relation between information and technology? When trying to find frameworks that connected these two concepts, there had been very little research in the area. So, through the form of thematic analysis, these iSquares inspired a new model that explores the role that technology plays in people's perception of information.

To separate the iSquares that contained forms of technology in them, a determinate definition of technology was needed. The definitions of technology have been vast, and have been evolving as technology advances. A practical definition which would help to deductively select iSquares was, "The application of scientific principles to solve practical problems. It can have 3 facts: the material artifacts, the use of artifacts to produce a goal, and knowledge of how to use these artifacts." Levin (1996). In particular, to narrow the selection, iSquares with technology developed in the 20th and 21st century was selected. This method began with a deductive approach to analysis; however, once the subset of technology-contained iSquares was selected, finding patterns and relations translated to an inductive strategy, resulting in an interpretivist approach on the epistemological spectrum. (Diagram A)

(Diagram A: A flow chart with a circle labelled "Technology and Information" as the centre hub. Three rectangles reach into the hub through lines without arrows. The three rectangles are labelled, "Technology to communicate information: information that others know that I may not", "Technology to store information: i.e. databases and Google can be storage and access", and "Technology to create information: When new technology emerges, new information is created.")

To Communicate: Many iSquares were drawn in a manner that combined technology with humans, or linked technology to other objects using arrows. This translates to the fact that information that exists is communicated, whether it is the person/object communicating the information, or whether it is the person/object that is obtaining this information.

To Store: Binary code is a way to digitally store information at its most fundamental level, and this was present in the iSquares drawn. Databases like Google Inc. are also ways of storing information, however their ability to efficiently access information relies on algorithms, which would categorize under Technology to communicate information.

To Create: An iSquare indicated that information can be viewed, as well as made through sensory perception and technology, which implies that technology can create information. With emergence of new technology, new information is attached to this technology, which also exemplifies how technology can create information.

There are indeed more relations that need to be explored, and through inspiration from other methods of analysis, it can be noted that technology can also be used to understand information. As more iSquares are created, a more formulated and wholesome theoretical framework can be designed to truly capture the role of technology in the visual perception of information.

Psychological Conceptual Analysis [Posa]

A conceptual framework from the discipline of Psychology, known as "The Information Processing Theory" can be used to formulate an approach to visually analyze the JHiSquare corpus. This analytical approach closely follows the interpretivist outlook, as the associations one makes between visual images and psychology are socially constructed, and often informed by preexisting knowledge of psychological concepts, and symbols (Ex. we associate brains with cognition). The Information Processing Theory was initially conceived by psychologists such as Atkinson and Shriffron (1968), and later modified by figures such as Craik and Lockhart (1972) (as cited in "Information Processing Theory," 2015). Cognitive psychologists formulated this theory as a means to better understand the seemingly

intangibility of mental processes, such as attention, memory, problem solving, and processing information, etc. (Macleod, 2008). In an attempt to materialize the immaterial nature of this psychological process, the Information Processing Theory uses the analogy that the human mind functions similar to a computer (Macleod, 2008). The theory outlines the ways in which humans receive and transform sensory stimuli into meaningful information through a series of stages ("Information Processing Theory," 2015). Analysis of the JHiSquare corpus can be done by organizing various drawings into one of three stages of Information Processing.

1. Input Stage: First, an organism must interact with the environment to receive sensory stimuli (Maclead, 2008). At this stage, information is purely sensory and not yet something that organisms can cognitively manipulate or attend to. JHiSquares characteristic of this stage often depict the reception of environmental stimuli through sensory organs, such as the eyes, ears, mouth etc.

2. Storage Stage: The organism actively manipulates sensory input, through various mental processes (Macleod, 2008). JHiSquares characteristic of this stage often reveal images of heads and/or brains undergoing sorting processes, or depictions of patterns that are organized and grouped according to specific visual criteria.

3. Output Stage: This is when the organism responds to the environment using the information that they have attained (Macleod, 2008). JHiSquares characteristic of this stage often include images of organisms interacting, communicating, and undergoing exchanges with others, or with the environment.

   Information processing is dynamic process that is appropriately suited to this cognitive framework, however, as with many analytical approaches, there are indeed outliers that reject categorization according to this psychological method.

Deep Learning [Shi]

Using Google's Deep Learning algorithm: Artificial Neural Networks that mimic human brain neurons, this system can constantly learn and

improve on it's own by being exposed to more and more data - this process is called "training" (similar concept as how AlphaGo was developed).

In this project, I used an already trained deep learning system, let's call it "AI"
(see diagram B)

(Diagram B: A flow chart from left to right, starting with two squares labelled separately as "iSquare by Person A" and "iSquare by Person B." The two squares are linked by one-way arrows to a centre image of a brain labelled "AI: AI uses its own knowledge to interpret the images and combined them with its own logic." This square connects to one more square in parallel position placed in the right by a one-way arrow labelled, "An image representing what AI thinks information is, based on A and B.")

The output image as you can see is not simply a mixture of the original drawings; instead, it shows a new perspective, that is "how information itself think what (humans think) information is."

As the AI technology advances, we will eventually be able to feed millions of iSquares into the system along with text descriptions, and ask it (or her?) "what is information?"

Site of the Audience
This showcases what information ultimately is a reflection of the experiences and interpretations that you made for us.
Lastly, we come to the site of the audience - you. The JHiSquare project comes together with this exhibition, and with you as our viewers. As you look into the differently placed mirrors, you will see yourself reflected back at you. This showcases what information ultimately is - a reflection of the experiences and interpretations that you made for us. The most important element of the project is the connection between our research question and the people who brought it to life in squares of beautiful and colourful artwork. Thank you for being a part of the JHiSquare project, and for bringing information to life.

About the Cover
The idea for the cover came to me around the end of the JHI research program. I reflected on what our group created during one of the best

months of university life so far tried to integrate our experiences and product into one composition.

This was our first time adding colour to our Draw-and-Write data gathering sessions and the JHiSquares our group collected were complex and multifaceted. As a result, I chose a colour transparent tesseract, or four-dimensional cube to represent the amount of diversity and depth the iSquare research team hasaccumulated in the past. This also hints that getting to the bottom of the nature of information can perhaps be beyond our comprehension at the moment. Nonetheless, we continue our research to define it.

The "i" created from binary code at the centre of the front cover composition was typed in OCR Extended and should be recognisable by many machines. It spells out:

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Thanks & Connect
The JHI junior scholars from the iSquare Research project would like to thank professor Jenna Hartel, Rebecca Noone, Stephanie Power and Christie Oh for letting undegraduates experience empirical research at the Faculty of Information in the University of Toronto. Equally, we thank Ira Wells for coordinating with the Jackman Humanities Institute to create the Scholars-in-Residence program, making May 2017 a truly memorable month for all of us.

www.isquares.info