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研究課題名(和文) Understanding Pictorial Perception

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研究成果の概要(和文)：この研究は、「絵」がどのように知覚されるのかについての我々の理解を深めることを目的とした。「絵」を見ることはそれを2Dと3Dで同時に見ることである。平面(2D)を見るのと同時に描画オブジェクト(3D)を見るのである。これが脳の視覚システムでどのように可能になるかは、哲学者や心理学者にとって不思議なことである。この研究の結果、1)「絵」の知覚を可能にする「視覚」においてユニークな点は何か、そして2)「絵」の知覚が知覚の恒常性について理解する時に、誤りをもたらしたかもしれない、という2点において深い理解を得ることができた。

研究成果の学術的意義や社会的意義

私たちの生活は「絵」に囲まれているにもかかわらず、「絵」の知覚のプロセスについてはほとんど知られていない。このことは驚くべきことである。視覚的知覚の研究の歴史において、視覚的知覚のもともとの感覚的形態は2D絵画的画像であるとしばしば誤って仮定されてきた。今回の研究では、この間違いがどのように発生したのかを説明した。さらに、「絵」の知覚の基本的な要素を探求する際に、視覚的知覚と他の知覚の類似点と相違点に注目したことは、新しい探求であった。

研究成果の概要(英文)：This research aimed to further our understanding of how it is possible to perceive pictures. To see a picture is to see in 2 and 3 dimensions at the same time. It is to see the object pictured (3D), yet simultaneously to see the flat surface (2D). How this is possible for the visual system is extremely mysterious, both for philosophers and psychologists. The outcome of the study was a deeper understanding of 1) What is unique about vision that it allows picture perception, and 2) How picture perception may have led to a systematic mistake about the nature of visual constancy.

研究分野：Philosophy of perception

キーワード：Philosophy of perception Philosophy of mind

様式 C-19、F-19-1、Z-19、CK-19 (共通)

1. 研究開始当初の背景

Perception has implicitly been referred to for hundreds of years as a core component of the visual system. When Kepler discovered that the role of the lens in the eye is to project an image on to the retina, it was assumed that this image was conveyed, somehow, to the mind. The implicit idea is that if only we understood how this 2D image is conveyed to the mind, the problem of understanding the first stage of vision is essentially solved. A corollary of this is that the first “sensory” stage of vision was assumed to be two-dimensional. Many, famously including Berkeley in his “A New Theory of Vision”, held that insofar as we see in three dimensions, this is a kind of learned judgement, not something we visually experience. This idea stuck, and has been part of the study of vision ever since. Arguably it was not until the Gestalt psychologists in the early part of the 20th century that idea of the two-dimensional sensory field was discarded, and even then mainstream vision science did not fully incorporate this important insight, and references to a 2D visual field can be found much more recently. Part of the problem with the “2D to 3D” order of explanation is that it seemed to assume that 2D images are unproblematically understood, which is not the case. Only recently has serious research begun into how we see objects in pictures, and it turns out that we understand picture perception far less than we understand the perception of ordinary objects. For example, although we perceive the world through five senses, we only see pictures. There do not seem to be pictorial experiences in other senses. Understanding the reason for this may help us to understand both picture perception and visual perception more broadly.

2. 研究の目的

This research aimed to further our understanding of how it is possible to perceive pictures. To see a picture is to see in 2 and 3 dimensions at the same time - it is to see the object pictured (3D), yet simultaneously to see the flat surface (2D). How this is possible for the visual system, and apparently only the visual system, is extremely mysterious, both for philosophers and psychologists. At the same time, one reason that visual experience is often compared to pictorial experience is that there are aspects of a phenomenon known as perceptual constancy that evoke experiences similar to pictorial experience. This research aimed to investigate both the links between perceptual constancy, visual experience, and pictorial experience.

3. 研究の方法

The primary question which this research aims to answer is: What makes picture perception possible? In order to answer this question, there were several prior questions to be tackled:

- Are philosophical accounts of picture perception consistent with psychological accounts? Can they be brought together?
- Is pictorial experience a perceptual or conceptual ability? To what extent must the perceiver understand that they are looking at a picture?
- If vision is the only modality in which pictures can be perceived, what does this say about vision as a perceptual modality?

As a philosophical project, the method of research was the careful analysis of relevant arguments, concepts and empirical results.

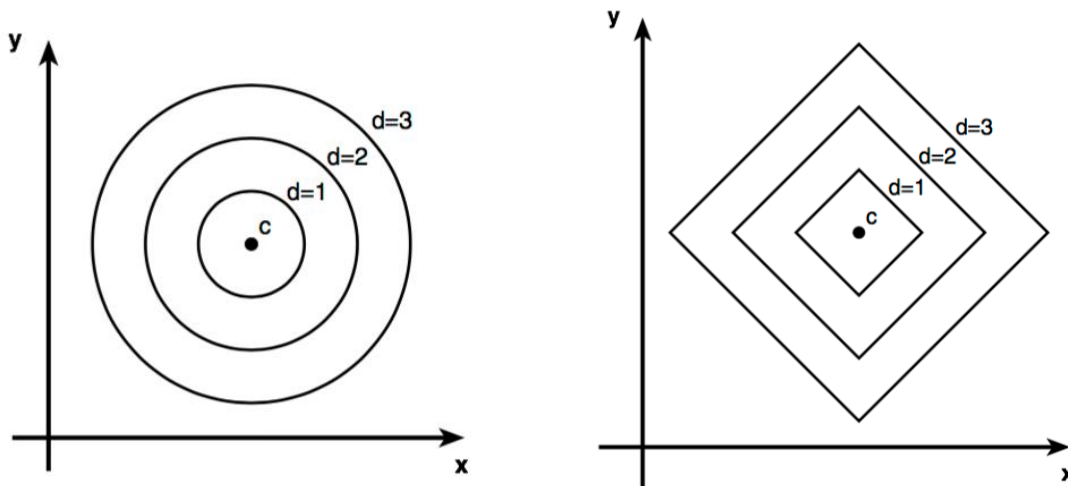
4. 研究成果

(1) Vision and pictorial experience: It is often assumed that pictures are specific to vision. This makes it an interesting question: Is pictorial experience really specific to vision, and if so, why? I approached this question via an analysis of the different components of pictorial experience: pictures two-foldedness (the simultaneous experience of 2 and 3 dimensions), depictive (we perceive objects or scenes in pictures), continuous (seeing an object in a picture is very similar to seeing the object itself), and transparent (a picture of a picture is also a picture). Looking at other modalities through this analysis gave a clearer picture of why it is that pictures are unique to vision:

Modality	Depictive?	Continuous?	Transparent?	Two-folded?
Vision	Yes	Yes	Yes	Yes
Hearing	Yes	Yes	Yes	No
Touch	Yes	No	Yes	Yes
Taste	?	No	Yes	No
Smell	?	Yes	Yes	No
Proprioception	?	?	?	?

The table above summarizes once main finding of this research, which is that pictorial perception is unique to vision - not because there is anything single aspect of visual experience which is unique, but rather because vision has a unique combination of features. If we break pictorial experience into a number of features that together seem to make it what it is, we find that each of the separate features is had by at least one of the other modalities, though none of the other modalities instantiates perceptual experience.

(2) Perceptual constancy and the idea of 2D sensations: Perceptual constancy, often defined as the perception of stable features under changing conditions, goes hand in hand with variation in how things look. A white wall in the orange afternoon sun still looks white. Historically, this variation has often been explained in terms of our experience of 2D “merely sensory” or subjective properties, like a picture - an approach at odds with the fact that the variation does track objective features of the perceptual situation, such as illumination (in the case of colour constancy). A recent approach, becoming more common, is to account for the variation in terms of further “dimensions” to perceptual experience. Especially in color perception, this is a natural thought to have but the idea is often left vague. I found that the “dimensional” strategy has problems of its own, but is useful in drawing out some interesting complications in the way perceptual experience is structured. Specifically, the structure of “constancy spaces” brings out the senses in which there is stability and instability in the experience of constancy, without the need for novel or merely subjective features.



Equidistances under the Euclidean (left) and city block (right) metric Image from Gärdenfors, P. (2004). *Conceptual spaces*, p.19

Figure 1

One problem with the dimensional strategy is that surface colour and illumination describe a space with conflicting properties. Since surface colour and illumination are obviously separate qualities (known from the fact that perceptual constancy exists), they

ought be captured by a quality space with separable dimension where distances follow a “city block” metric (see Figure 1). However, in other ways illumination and surface colour are more tightly connected than a separable quality space can capture. A main finding of this part of the project was that this contradictory feature of perceptual constancy.

The fact that, in the case of illumination and surface color, both of these pair are colors, together with the historical neglect of illumination perception, has made the problem of instability in color constancy particularly difficult. Object size and distance have the same features when considered as dimensions of a size/distance experiential quality space. Although size and distance are visibly distinct properties, what we experience is an irreducibly complex of these. We see not just size, but size-at-a-distance. Shape and orientation share the same tight connection: we see oriented shape, not shape and orientation as entirely independent features of the experience. As visible object features, shape and orientation are distinct (the dimensions are separable in this sense). Yet shape cannot be seen without being seen to be at some orientation (the dimensions are integral in the sense) – at least, not by creatures with our visual system. “Looking square” does not name a concrete shape experience, merely a range of shape experiences; looking square at the different orientations compatible with perceptual constancy. Hence, the experience of shape (more strictly, of oriented-shape) changes as an object’s orientation changes, without the shape dimension changing.

In this way, I found that it is not necessary to account for the experience of perceptual constancy by alluding to a 2D picture-like experience. It can be hoped that this finding will add to the existing body of work on perceptual constancy, but also to research on pictorial experience, since it undermines the idea that there is an original 2D sensory impression which is, essentially, a picture.

5. 主な発表論文等

[雑誌論文] (計 2 件)

J. O’Dea, 2018, “Art and Ambiguity: A Gestalt-Shift Approach to Elusive Appearances”, *Phenomenal Presence*, F. Dorsch and F. Macpherson (ed.) Oxford University Press, 58-76. (Total pages: 304, ISBN: 9780199666416)

J. O’Dea, 2018, “Book Review: Sensory Blending: On Synaesthesia and Related Phenomena”, *Notre Dame Philosophical Reviews*, 2018. 8. 17, <https://ndpr.nd.edu/news/sensory-blending-on-synaesthesia-and-related-phenomena/>

[学会発表] (計 5 件)

J. O’Dea, “What is a Sense Modality?”, *Setouchi Philosophy Forum: Bridging Analytic and Phenomenological Approaches*, July 1, 2018, at Hiroshima Institute of Technology.

J. O’Dea, “The varieties of Pictorial Experience” *Hamburg-Japan Philosophy Workshop*, University of Hamburg, August 24-25, 2018.

J. O’Dea, “What is a sense Modality?” *Setouchi Philosophy Forum: Bridging Analytic and Phenomenological Approaches*, Hiroshima University, June 30, 2018 – July 1, 2018.

J. O’Dea, “The Colour of Darkness: Lessons About the Nature of Colour” *Dagstuhl Seminar, Workshop on Color Primitivism and Non-reductive Minds*, Brandon University, Winnipeg, Canada, May 17, 2017.

J. O’Dea, “Stability, Instability and Multistability in Perceptual Experience” *Rutgers University/Barnard College Philosophy of Mind Workshop*, New York, July 21, 2016.

[図書] (計 0 件)

[産業財産権]

○出願状況 (計 0 件)

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〔その他〕
ホームページ等

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