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ABSTRACT

The first part of this essay discusses recent neurobiological discoveries in the realm of line and color perception as they manifest as reactions of our visual brains to stimuli in visual art. It subsequently explains the design and findings of a psychophysical test, which was conducted with the aim of gaining insight into whether so-called experts and non-experts are equally capable of distinguishing straight lines in paintings, created freehand or with the use of self-adhesive tape. The second part of the essay focuses on the particularly creative adaptations of self-adhesive tape in the work of select contemporary painters: Ed Ruscha, Michael Craig-Martin, Tim Eitel, Magnus Plessen, Silvia Plimack Mangold, Mel Bochner, Ben Johnson, Cipriano Martínez, Bernard Frize, and David Reed.

Key words: *Neuroscience; psychophysical test; self-adhesive tape; contemporary painting.*

RESUMEN

La primera parte de este ensayo discute descubrimientos neurobiológicos recientes en el ámbito de la percepción de la línea y el color a medida que se manifiestan como reacciones de nuestro cerebro visual ante estímulos del arte visual. Subsecuentemente, explica el diseño y los hallazgos de un test psicofísico, que se llevó a cabo con el objetivo de obtener conocimiento sobre si aquellos denominados expertos y no expertos son igualmente capaces de distinguir líneas rectas en pinturas, creadas a mano o con el uso de cinta adhesiva. La segunda parte del ensayo se concentra en las adaptaciones particularmente creativas de la cinta adhesiva en el trabajo de algunos pintores contemporáneos selectos: Ed Ruscha, Michael Craig-Martin, Tim Eitel, Magnus Plessen, Silvia Plimack Mangold, Mel Bochner, Ben Johnson, Cipriano Martínez, Bernard Frize y David Reed.

Palabras clave: *Neurociencia; test psicofísico, cinta auto adhesiva, pintura contemporánea.*

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Linking Neuroscience To A Psychophysical Test On Line Perception And To The Use Of Self-Adhesive Tape In Contemporary Painting

Pia Gottschaller¹

INTRODUCTION

The research discussed in this essay began with a Caroline Villers Research Fellowship in Technical Art History at the Courtauld Institute of Art, London, in 2012, and the initial focus was on the techniques and tools that Western artists used in the twentieth century for painting the straight edges and borders of abstract forms. The wide range of techniques observed includes the application of paint freehand, with a brush, the use of aids and tools such as straightedges and ruling pens, and, since the invention of pressure-sensitive tape in the US in the mid-1930s, self-adhesive tape. My research subsequently extended to include works of modern Latin American painters, and two recently completed publications discuss the results of the first portion of my research, on works by European and North American artists, whilst the second one focuses on Argentine, Uruguayan, and

¹ Getty Conservation Institute.

Brazilian Concrete and Neo-Concrete painters.² This third essay aims to complement and expand on these previous deliberations on the artists' motivations for preferring one method over another, as well as on how their choices affect our perception of works. It is hence divided into two sections: Firstly, a discussion of what neuroscience teaches us about vision, and, in particular, what the psychophysical test I conducted can tell us about our surprisingly exact perception of lines, edges, and borders in paintings. The second part describes the use of the most recent addition to the painter's toolbox for making precise lines, self-adhesive tape, as used and adapted by a number of contemporary artists in particularly creative ways.

The passion with which abstract artists engaged and still engage in discussions about the aesthetic effects created by self-adhesive tape is remarkable and indicates the importance of seemingly negligible details of technique and process. The old adage applies: The simpler something looks, the more difficult it probably was to make it. Once abstract artists in the early twentieth century had reduced the compositional elements to essentially color and geometric form, the specific transition between colored fields—whether wavy, blurry, gradual, or sharp—conveyed either a more crafts-based, handmade quality, achieved by using a brush freehand, or a more industrial, machine-made appearance of a work, as it results from the use of a ruler, ruling pen or tape. Which of these approaches abstract artists embraced depended initially, in the period before World War II, on whether they considered their artworks agents of spiritual cognition, as did Wassily Kandinsky, or agents of social transformation, as did Aleksandr Rodchenko. After tape became more widely, commercially available in the late 1940s, influential artists such as Piet Mondrian and Barnett Newman



Figure 1. Discarded bits of tape on a fuse box in Magnus Plessen's studio in Berlin, 2012. Photo by the author, courtesy of the artist.

2 P. Gottschaller, "From Ruler to Tape: Stops and Starts in the History of Painted Abstraction", *Getty Research Journal* 10, The University of Chicago Press, Chicago 2018 (accepted); and P. Gottschaller, "Making Concrete Art", in P. Gottschaller and A. Le Blanc: *Making Art Concrete: Works from Argentina and Brazil in the Colección Patricia Phelps de Cisneros*, eds. P. Gottschaller, A. Le Blanc, Z. Gilbert, T. Learner, A. Perchuk, exh. cat. J. Paul Getty Trust Publications, Los Angeles, 2017, pp. 25-59.

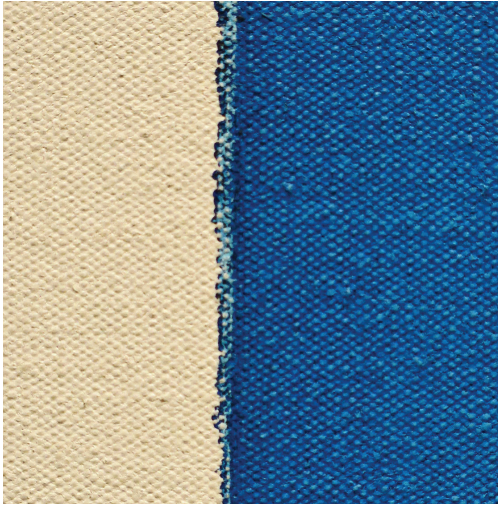


Figure 2. Detail of Barnett Newman, *Shimmer Bright*, 1968, oil on canvas, 182.9 x 214 cm, left hand edge of painting with blue paint bleed. Photo by the author.

incorporated it into their repertoire, yet in fundamentally differing ways. Mondrian never used tape for actually painting his black and colored bands—he used a straightedge to do that; tape was strictly limited to helping him work out the placement of compositional elements. Newman, however, developed such a mastery of controlled tape applications, with effects ranging from razor-sharp ridges to provoked paint bleed, that he effectively voided the dichotomy of earlier ideological debates. Since then, artists have not necessarily felt the same need to defend their use of tape—they no longer worry that it indicates a lack of manual skills. Rather, the use of tape can be attributed to the artists' aim to convey a determined aesthetic that could not be achieved with different means.

The specific qualities of a taped line

Before discussing specific examples of works, clarification is needed on how a line painted freehand can be visually distinguished from one painted with the help of tape. Sometimes the differences are so subtle that only examination with a high-powered microscope can lead to a decision. In very basic terms, however, the main difference lies in their topography, in the specific way that paint sits on top of a surface. Taping will usually lead to the creation of small, sharp ridges of paint: as the artist brushes against the edge of a length of tape, the material flow is abruptly stopped there and paint collects at this edge. More light will be reflected off at this slightly higher level, throwing the ridge into relief.

A second criterion for distinction is the “unnatural” straightness of a taped ridge: generally speaking, a human hand alone is unable to keep balanced and steady enough to produce the same perfection. A notable



Figure 3. Detail of Biggs and Collings, *Numbered*, 2014, oil on canvas, 127 x 127 cm, with sharp ridges from taping along all edges of the elements. Photo by the author.

exception was Josef Albers, who executed the edges of the squares and rectangles in his oil paintings with nothing but a palette knife. The way Albers manipulated wet paint through highly controlled pressure on the flat metal blade, with the steadiest of hands, to accumulate at the edge as a slightly rounded bead can appear deceptively similar to a taped ridge.

A taped line can also be distinguished from a line painted with a ruler, set square, or cardboard edge: the resistance of these hard edges against a loaded brush also creates a ridge, but it tends to be not quite as sharp, nor ribbed from the texture of the crimped paper carrier, nor as high. The use of a ruling pen—popular with architects, engineers, and graphic designers for drafting until computers came into use—can lead to a similar effect: an artist might paint a single line or two parallel lines with the ruling pen, dilute paint, and a ruler, sometimes followed by filling in the spaces in between lines with more paint of the same color. Often the edges of such peripheral lines can still be discerned: a ruled line would look semicircular in cross section, like a soft mound without any sharp ridges. The pointed metal tips of the ruling pen also tend to leave two parallel lines of incisions in the softer paint layer or ground underneath.

Other indications of tape use can be tiny paint losses along the edge, caused by pulling up the tape at too steep an angle, or too late in the drying process. Another telltale sign is so-called paint bleed, or seepage caused by capillary action: the wet paint either gets squashed underneath the tape, or it dries in the form of “spider legs” when there is electrostatic tension between the tape and surface. In both cases, most of the paint is driven into the interstices of the canvas.

For an artist like Ed Ruscha, tape use presents additional challenges: “There are countless brands of masking tape—once I find a good one (does not leave residue, adhesive is good all the way to the edges so it won’t leak) then they find a way to make it cheaper—then I have to find a newer, better one”.³ Ruscha has used both low-tack

³ Email correspondence between author and Mary Dean, E. Ruscha’s assistant, who relayed



Figure 4. Detail of Bridget Riley, *Prairie*, 2003/1971, acrylic on linen, two panels, 196.9 x 786.2 cm, with ruled orange and purple lines. Photo by the author.

clear tape and masking tape since about 1959-60, for painting in oil and acrylic architectural elements and letters, but “not in every instance”.⁴ Ruscha believes that tape achieves an effect “not possible in hand painting, but masking tape itself was never part of a finished work of art. It was always used to achieve certain desired effects only.” Nonetheless, Ruscha sees tape as “an indispensable tool in the making of art of almost any kind”,⁵ a sentiment echoed by many other contemporary artists.

Some neuroscientific fundamentals of line and color perception

The challenge that the consistent, radical reduction of the visual vocabulary of abstract art in the twentieth and twenty-first century still presents to many viewers raised the question whether everyone is equally capable of making the subtle distinctions between the painting techniques discussed above. Is this capability something that only art

the artist's responses, 26/03/2013.

4 Ibidem.

5 Ibidem.

professionals learn through visual experience and practice, or is it an innate capacity of everybody in equal measure?

The field of neuroaesthetics, a term coined by Semir Zeki, the most prominent representative of the field, provides some answers. Thanks to Zeki's groundbreaking research in neurobiology, techniques such as magnetoencephalography (MEG) have been applied to the study of how the visual brain functions in relationship to visual art. As a result of his work and that of other neurobiologists, the last 25 years have seen a considerable increase in our understanding of the mechanics of vision. Perhaps the most shocking and often still negated realization is that we do not see with our eyes, but with our brains. The mistaken belief that the eye is like a fancy camera that sends images to the entire visual system is called the "homunculus fallacy".⁶ Instead, the function of the visual system is to process light patterns into information that is useful to the organism.

Zeki argues that "artists are, in a sense, neurologists who unknowingly study the brain with techniques unique to them".⁷ We are for the most part unaware of the fundamental laws of vision, despite the fact that our understanding of the world is to a very large extent based on vision, which happens to be our most efficient mechanism for acquiring knowledge.⁸ In neurological terms, perceiving something means being conscious of something. Neuroscientist Antonio Damasio defined the process further: "Consciousness consists of constructing knowledge about two facts: that the organism is involved in relating to some object, and that the object in relation causes a change in the organism".⁹

The crucial nexus between art and the visual brain is that both are engaged in abstraction as a way of organizing knowledge. All art is an abstraction in the sense that artists abstract essentials from the particulars, and subsequently give form to their abstracted ideas. By the same token, the primordial function of the visual brain is "the acquisition of knowledge by registering the constant and essential characteristics of objects".¹⁰ If the visual brain were unable to prioritize certain kinds of knowledge, such as the constant features of objects and surfaces, it would be overwhelmed by superfluous information.

6 M. Livingstone. *Vision and Art. The Biology of Seeing*. New York, 2002, p. 24, Harry N. Abrams.

7 S. Zeki. "Artistic Creativity and the Brain", *Science* 293, 6 July 2001, p. 51.

8 S. Zeki. *Inner Vision. An Exploration of Art and the Brain*. Oxford, 1999, p. 4. Oxford University Press.

9 A. Damasio. *The feeling of what happens. Body, emotion and the making of consciousness*. London 2000, p. 20. Constable and Company Limited.

10 S. Zeki. "Artistic Creativity and the Brain", *op. cit.*, p. 52.

The seat of the visual brain, the cerebral cortex, is divided into areas that are functionally specialized for the recognition of form, color, motion, depth, faces, and objects, among others. The processing of color, motion, and depth is much better understood than that of form. Research found that when we look at an object, we first perceive its color, 40 milliseconds before its form, and only 40 milliseconds later do we register any motion.¹¹ Perception is therefore a process that happens in time as well as in space.

The neural building blocks of form perception are orientation-selective cells. Cells in the primary visual cortex, V1, respond selectively to vertical and horizontal straight lines.¹² Other cells respond exclusively to oblique straight lines, whilst no cells have yet been discovered that focus on curves.¹³ All possible orientations are represented equally,¹⁴ and the cells respond to a particular orientation no matter what the contrast or color may be.¹⁵ The cells abstract for verticality, for example, without being concerned about what is vertical.¹⁶ Orientation-selective cells are probably the most commonly found cells in the visual brain, which leads Zeki to state that “given the importance that lines have assumed in much of modern and abstract painting, and given that lines constitute about the most basic visual stimulus with which to excite a very important category of cell in the cortex, it becomes at any rate interesting to ask whether the relationship between the two is entirely fortuitous”.¹⁷ Much evidence points to the fact that it is not.

The neurobiologist Margaret Livingstone has carried out some of the most interesting research into the second component of concern here, color. Her findings stress that our perception is based on “opponency,” on contrast, and that in fact our color perception as such is quite coarse. Our eyes gather the most basic visual information in terms of luminance, or lightness/value, thus luminance must be considered as fundamental

11 S. Zeki. “Neural Concept Formation and Art: Dante, Michelangelo, Wagner”, *Journal of Consciousness Studies* 9, 2002, p. 9; and S. Zeki. “Splendours and Miseries of the Brain”, *Philosophical Transactions of the Royal Society B*, 354, 1999, p. 2059. New research suggests that we are able to process images in 13 milliseconds, much quicker than the 100 milliseconds previously suggested.

12 D. H. Hubel and T. N. Wiesel. “The Ferrier lecture. Functional architecture of macaque monkey visual cortex”, *Proceedings of the Royal Society*, London, B, 198, 1977, p. 8.

13 S. Zeki. *Inner Vision*, *op. cit.*, p. 116.

14 S. Zeki goes on to explain that “perceptual experiments show that these two orientations are indeed the easiest to see” (*Ibidem*, p. 115).

15 D. H. Hubel and T. N. Wiesel. “The Ferrier lecture”, *op. cit.*, p. 8.

16 S. Zeki. “Neural Concept Formation...”, *op. cit.*, p. 12; *Inner Vision*, *op. cit.*, p. 102.

17 S. Zeki. “Art and the Brain” *Daedalus*, 127, 2, 1998, p. 93.

to art making as color, texture, shape, and line.¹⁸ Color is most relevant when we recognize faces or objects, or indeed color itself—Livingstone calls it the “What system”—but color is quite irrelevant when collecting information in the “Where system,” such as figure/ground and motion/depth segregation. The latter is in fact colorblind.¹⁹ This means that as long as the luminances of an image are “correct,” we can make sense of it without paying attention to the actual colors. An example would be a portrait where the artist decided to paint the nose blue: as long as there is a clear difference in luminance between the blue and surrounding areas, we can still recognize the facial features.

Neurons have been shown to respond best to sharp rather than gradual changes in luminance: the so-called center/surround organization makes us more sensitive to a line drawing rather than a graduated color shift. We gather the maximum amount of information about the shape of an object at its edges: instead of defining the color of a monochrome area in many different spots, the visual cells only register the change from one color to another at the border. Livingstone argues that artists have taken advantage of these phenomena, for example, by using lines, despite their rare occurrence in real life, as representations of contours, although contours are actually borders between areas of different color or lightness.²⁰

Psychophysical test

Zeki wrote in 1998:

It is worth emphasizing that there is much about the perception of lines (...) that we still do not understand physiologically and it is therefore impossible to relate directly the experience of even one line to what really happens in the brain. If viewed at a sufficiently close distance, even a single vertical line, for example, may fall on the receptive fields of many cells that are specific for the vertical orientation; how the brain combines the responses of these cells to indicate a continuous vertical line is a mystery that neurology has not yet solved, nor has it solved the question of how it may differentiate one vertical line from other vertical lines that are distinct from it and indeed differentiate the entire tableau from its surround.²¹

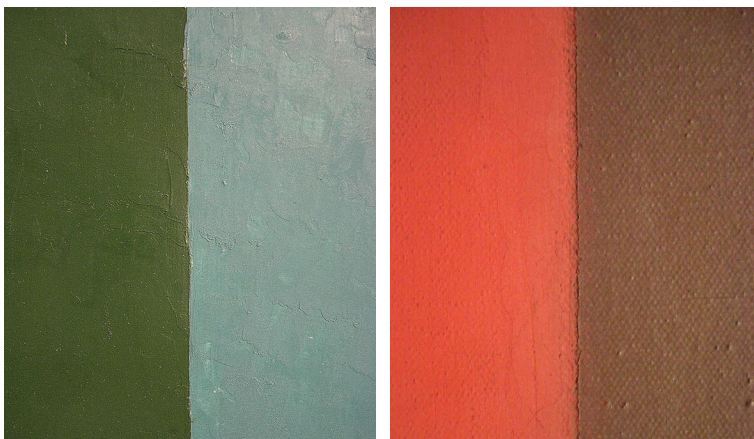
With this cautioning in mind, I set out to conduct a test with the intention to provide us with an indication of whether indeed the differentiation of one painted vertical line from another painted vertical line is possible

18 M. Livingstone. *Vision and Art*, pp. 10, 38.

19 M. Livingstone. *Vision and Art*, pp. 46, 64.

20 M. Livingstone. *Vision and Art*, p. 61.

21 S. Zeki. “Art and the Brain”, *op. cit.*, pp. 95-96.



Figures 5-6. Two examples of images used in the psychophysical test (untaped on the left, taped on the right). Photos by the author.

only for “experts,” such as painters or conservators of modern art, or if “non-experts” from all walks of life are able to make such distinctions as well. My observation-based hypothesis, although ultimately intuitive, was that there would not be much of a difference, even though one group might be able to give reasons for their distinctions, whereas the other might not.

An experiment involving MEG imaging was far beyond the resources and scope of the project, but a psychophysical experiment was deemed feasible.²² The relatively simple test, devised after consultation with Zeki and with the help of a computer programmer who had worked with him in the past, allowed me to gather enough information to be able to compare the performance of two groups in very basic, limited terms.²³ It is important to stress at this point that no claim to scientific thoroughness or statistical relevance can be made here; the primary aim of this test was to give us a first idea of whether this subject was worth pursuing by professional neurobiologists in the future.

²² The images appealed probably predominantly to the V4 and V1 areas in the cerebral cortex, i.e. to cells critical for constructing colors as well as to orientation-selective cells. Although the latter can be found in V1, V2, V3 and V4, abstract forms are known to involve the activity of a restricted set of areas. Hubel and Wiesel found that there is also a hierarchy among these cells: simple cells respond only to optimally placed lines, while complex cells respond to a wider range, and hypercomplex cells do not respond at all when the line is extended beyond the region from which responses are evoked. D. H. Hubel and T. N. Wiesel. “The Ferrier lecture”, *op. cit.*, p. 8.

²³ We based the basic experimental conditions on those described by S. Werner and B. Thies. “Is ‘Change Blindness’ Attenuated by Domain-specific Expertise? An Expert-Novice Comparison of Change Detection in Football Images”, *Visual Cognition*, 7, 1-3, 2000, pp.163-173. The author thanks Jonathan Stutters for writing the code for the psychophysical test.

The two test groups were made up of 20 volunteers, 10 of which were considered “experts”: abstract painters, painting conservators, and art historians. The other 10 “non-experts” were professionals in finance, medicine, education, journalism, and science. The observers were placed in a quiet room in front of a laptop computer with two color-coded keys on the keyboard, a red N for “not taped” and a green T for “taped.” After some introductory remarks, the program was started and a sequence of 200 images appeared on the screen. Each image was a photographic detail of an actual painting, showing a centered vertical line, i.e. a straight border between two differently colored areas. One hundred of the images were of borders painted freehand without any tools, and the other half of the images showed borders painted with self-adhesive tape.²⁴ The images were shown in random sequence, for seven seconds each, and the observers were asked to record their decision within this timeframe by pressing one of the two keys. After seven seconds a so-called visual interference image appeared for one second, to prevent afterimages and visual fatigue. The entire image sequence lasted for half an hour, at the end of which the test results were automatically saved in a file.

We decided to orientate all of the borders vertically as we know that the visual brain contains equal numbers of vertically and horizontally selective cells, and that we process vertical and horizontal lines more easily than oblique ones. We chose to limit variables such as the magnification of details to a minimum, in order to enable observers to concentrate as much as possible on the actual quality of the lines—in other words, to facilitate constancy while representing as realistically as possible a range of binding media, paint supports, and application techniques. Our visual brain’s capacity for constancy is also what we counted on as compensation for changing viewing conditions such as differences of illumination, and for the fact that we showed reproductions of paintings rather than the actual objects.

The most successful detection rate of any of the 20 individuals was 91.5% and the least successful one 67%, but the average detection rate for experts and non-experts was remarkably close: 82.4% for experts and 77.5% for non-experts. This means a difference of only 4.9% between the two groups. No patterns could be made out with regard to age, gender, or nationality²⁵—in fact perhaps the most surprising result is

24 The details of paintings used in this test were taken from paintings in European and North American public and private collections.

25 The group consisted of eleven women and nine men ranging in ages from 20 to 72, from Europe, North America, and Asia.

that there were hardly any patterns in detection errors to identify.²⁶ The difference in detection rate at 4.9% between experts and non-experts can be interpreted as being negligible as it translates into an average difference of a mere 10 images—out of 200 images altogether.²⁷ Thus this simple test suggests that experts and non-experts might be almost equally adept at distinguishing between freely painted and taped edges.

A number of different factors seem to have influenced the outcome: an individual's level of confidence; the ability to concentrate on small details for a long period of time; and, most crucially, experience. Experience is impossible to quantify, regardless of whether it is purely visual or hands-on, and it might fall in the category of what is sometimes called "tacit knowledge". This concept, first proposed by philosopher and scientist Michael Polanyi in 1966, describes a type of knowledge that is, other than explicit knowledge, difficult to articulate and to convey: perception as "the most impoverished form of tacit knowing...forms the bridge between the higher creative powers of man and the bodily processes which are prominent in the operations of perception. (...) It is not by looking at things, but by dwelling in them, that we understand their joint meaning".²⁸ We are often unaware of possessing tacit knowledge, in large part because we acquired it with implicit means themselves. For instance, somebody who has never applied paint to a taped edge and watched it bleed underneath is unlikely to be able to attribute the phenomenon when coming across it. But there is in reality a sliding scale between the explicit knowledge of a painter who talks or writes about his or her practice of using tape, the implicit knowledge of a teacher who observed paint seep underneath strips of tape while painting window frames, and the implicit knowledge of a banker who last used a brush and paint at age six.

26 The vast majority of "errors" that non-experts made concerned taped lines, while with the non-experts there was no preponderance one way or the other. Some lines that had been painted with a palette knife created some confusion, but surprisingly more often in experts rather than non-experts. Some details of Barnett Newman's taped edges where paint had bled into unprimed cotton duck also seemed to create uncertainty in more than half of the test persons, regardless of whether they were experts or not. The generally higher error rate in the first phase of the experiment may be attributable to the fact that the majority of observers needed to see a certain number of images before being able to devise a set of criteria for assessment of the types of line. Some experts said that they at one point began to doubt the validity of their initial criteria and that this might have caused their performance to worsen towards the end. They also recounted that any subsequent attempts to rationalize their decisions made them probably less accurate. Non-experts on the whole less frequently experienced such confidence crises, probably because they also felt less of an expectation to "perform," which allowed them to decide more intuitively.

27 There are only 26 images of the altogether 200 that at least six experts, or at least six non-experts, misjudged each at a time. Considering that someone with an 80% result misjudged 40 images, this effectively means that the vast majority of errors are randomly distributed.

28 M. Polanyi. *The Tacit Dimension*. Chicago and London, University of Chicago Press, 2009, pp. 7, 18.

If perception means in neurological terms that we become conscious of something, then experts and non-experts are, at least according to this test, almost equally conscious of the subtlest differences in line. This would be a testament to the degree of sophistication at which our orientation-selective cells function, and it is also evidence of the fact that artists were and are justified in deliberating over whether to use a ruler, a piece of tape, or nothing to aid them in painting their edges. We all see in most cases which choices have been made, and we rightly attribute significance to them: “We can know things, and important things, that we cannot tell,” as Polanyi put it.²⁹

Creative adaptations of self-adhesive tape in contemporary painting

If we thus allow us for the time being to consider the importance of these artistic considerations as established, we are justified in paying close attention to the specific uses and creative adaptations of self-adhesive tape in the work of a number of contemporary artists discussed in the following. The focus of the above research was on the straight edges in abstract paintings, usually made with masking tape and less frequently with cellophane-backed transparent tape (e.g. Scotch tape). By now, tape has been a staple of contemporary art making more broadly, not just by painters, for over 80 years. The panorama has opened up considerably in this time period, and tape is now also employed for creating figurative and even photorealistic compositions, sometimes in combination with computers and self-adhesive film cut to shape. Some artists also use multiple kinds of tape in the making of a single work, depending on the desired effects. There are now more than an estimated 3000 different kinds of tape to choose from.

Michael Craig-Martin (b. 1941), an Irish conceptual painter who has lived in London since 1966, has combined in his paintings since the 1990s multiple possibilities of tape with the flat and bright colors of consumer goods. As a student, Craig-Martin took Josef Albers’s Basic Drawing Course at Yale University, and the drawing of lines has been the basis of his practice ever since. In 1995 he also curated an exhibition called *Drawing the Line*, which presented a comprehensive history of line drawing.³⁰

²⁹ Ibidem, p. 22.

³⁰ M. Craig-Martin. *Drawing the Line: Reappraising Drawing Past and Present*, exh. cat. South Bank Centre, London, 1995. The author thanks Rachel Barker for drawing her attention to this publication, as well as for her many insightful comments on the subject.



Figure 7. Detail of Martin Craig-Martin, *Inhale (Yellow)*, 2002, acrylic on canvas, 243.8 x 182.8 cm, with differences in thickness of paint between black and colored elements in the bottom left corner. Photo by the author.

The still life *Inhale (Yellow)* from 2002 consists of a lattice-work of black outlines, which the artist first drew on a computer as a collage of stacked household objects. The spaces between the lattice lines are filled with flat, uninflected hues, but at first the entire canvas was painted with a coat of black acrylic paint, applied with four-inch-wide rollers.³¹ The compositional lines were then masked off with tape and colored acrylic paint was applied to the spaces in between, again with a roller and in five to six coats, effectively leaving the black lines of the drawing in reserve. As they are more thinly painted and underlie the other colored fields, the canvas texture remains more visible in these areas. The slight, but

noticeable “step” between the black and colored areas helps the viewer recognize the objects as “flat sculptures,” as Craig-Martin calls them.³² Despite their random coloration and scale, our “Where system,” as discussed above, allows us to easily recognize these objects.

The volumetric quality of a “step,” that is a slight difference in level between painted areas, is an occasional side effect of tape use that Tim Eitel (b. 1971), of the so-called Leipzig School, at one point wished to avoid. He explained that early on in his career he began using tape for certain compositional elements, but with time grew increasingly obsessed with the desire to create the absolutely perfect line. Once Eitel realized that, he gave up tape because he felt that he was cheating; in his view, a painter should not take a “short cut,” but paint.³³

Until 2006 the Berlin-based painter Magnus Plessen (b. 1967) considered tape also as *malereifremd*, as foreign to painting, but he has since

31 D. Berning. “Artist Michael Craig-Martin reveals the system behind his work”, *The Guardian*, 20/9/2009, www.theguardian.com/artanddesign/2009/sep/20/painting-michael-craig-martin.

32 Ibidem.

33 Personal conversation between T. Eitel and the author, Gallery Campoli Presti, London, 11/10/2012.

incorporated it into his process to a degree that he now thinks of it as indispensable. Plessen's paintings are an exercise in calibrating the scales between certainty and uncertainty, between reality and illusion. Often individual limbs of a body can be made out, or a whole torso might be folded into the confines of the perimeter of a canvas.



Figure 8. Magnus Plessen, *Untitled (Dans La Serre)*, 2012, oil and charcoal on canvas, 140 x 185,5 cm. The work is seen in the artist's studio in 2012 shortly before completion. Photo by the author, courtesy of the artist.

paintings in progress during a studio visit in 2012, shorter and longer bits of masking tape could be detected in various strata of the works. Plessen uses tape straight forwardly as a sketching tool at any time of the process, to indicate the shape and position of a new element. But, more importantly, he also uses tape at all stages to create openings into the structure. Like a fossil, a bit

of paper tape may remain embedded for quite a while, get buried under several layers of oil paint, only to be excavated later to reveal a glimpse of an earlier state.

For Plessen, these gaps are invitations to see through to the reverse, like punctures that break through the uniform, two-dimensional plane of the painting. Equally key to his relationship to tape is the fact that he feels that the physical act of pressing down and removing the tape, of actually touching something real in an illusory space, is transferred to any interaction on the surface: "I can render some of the disruptions in representation probable because I fasten with tape the parts that are present at that point in my imagination, and I believe that this fixation remains preserved in some way when looking at the work".³⁴ Sometimes, at first sight and from a distance, a gap with the ragged outline of torn crimped paper tape might be interpreted as a physically present piece of tape, when actually there is none. These interruptions to the viewer's roving gaze are crucial, according to Plessen, as they invite contemplation.³⁵

34 Interview between M. Plessen and the author, Berlin, 12/1/2012.

35 Ibidem.

Another artist who enjoys creating *trompe l'œils* of beige masking tape strips is the North American representational painter Sylvia Plimack Mangold (b. 1938). For her seminal work *Collision* from 1977, the artist used Liquitex acrylic paint and a stipple brush to render the tape's striated texture.³⁶ This at once imitative, but also actual-

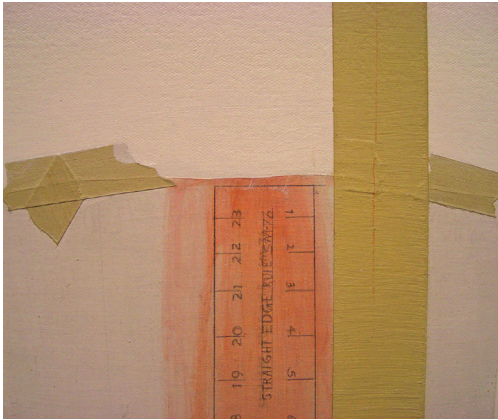


Figure 9. Detail of Sylvia Plimack Mangold, *Collision*, 1977, acrylic on canvas, 91.4 x 121.9 cm, with painted and taped pieces of masking tape in the centre. Photo by the author.

ly existent, crimped texture so characteristic of masking tape let her brush hop and skip over the ridges when she subsequently drew the very fine lines and arrows in red paint on top. The overall illusion is also crucially upheld by the skillfully copied steps between two bits of superimposed tape. Their sharp ridges, the overlay of their striations, and

a suggested crease are paramount to this mimetic effect. But as the artist explained, the title of the work refers to her experiencing an inner, felt collision, “between works that took up a lot of time rendering,” such as this one, and the desire to move on to “freer” paintings.³⁷

When, in the late 1970s, Plimack Mangold gave in to her new inclination, to less concept and more observation, she embarked on the landscape paintings that occupy her until today. Concomitant with her subject change was a switch from acrylics and cotton to oil and linen. These paintings often depict a single gnarly tree outside her studio window. She uses painted strips of torn tape as framing or editing devices, to suggest that the viewer is looking out through another window. They also set up foreground and background, and question what is real and what artificial. Some of the tapes are painted on a dark background, where their beige

³⁶ Telephone interview between S. Plimack Mangold and the author, New York, 13/12/2012. Plimack Mangold bought her art supplies at Arthur Brown's shop on 45th St. between 5th and 6th Avenue, New York. The shop, which prided itself on being “America's largest art supply distributor”, closed in 2013.

³⁷ Ibidem.

hue is visually absorbed so that they appear white, except in areas where strips of tape overlap and appear more beige again. The transparency of oil paint and the slow drying time of stand oil allow the artist to let the depiction of tape show her process of making an image, of how she “builds a surface. Not too unlike the nineteenth century studio paintings of the artist working at his easel”.³⁸

The ribbed texture of painted tape in *Collision* is crisper than that in these later works, yet the illusion is just as convincing, presumably because of the clear opponency between the hues of the background and tape. Plimack Mangold explained that she prefers to use the “normal” kind of masking tape in painting, the very same she depicts. In other words, there is a faithful correspondence between depicted object and means of creation. When the artist wants to control the degree of paint bleed, she applies a layer of transparent medium underneath the beige layer to seal off small interstices. Sometimes she greets the bleed, and sometimes she does not, but, as she stated, she would never retouch it.³⁹

New York-based Mel Bochner (b. 1940) began his *Thesaurus Paintings* as small word-based pieces in the 1960s, when he was still deeply involved with Conceptual Art. Since then, he has developed the *Thesaurus Paintings* into large works of bright and glossy hues.



Figure 10. Mel Bochner, *Silence!*, 2007, oil and acrylic on two canvases, 160 x 119.4 cm. Photo courtesy of the artist.

38 S. Plimack Mangold, diary entry of 8 August 1977, quoted in: C. Brutvan, *Collision. The Paintings of Sylvia Plimack Mangold*, exh. cat. Albright-Knox Art Gallery, Buffalo NY, 1994, p. 29.

39 Telephone interview between S. Plimack Mangold and the author, New York, 13/12/2012.

They roughly fall into two groups, of which the first one is very freely painted with lavish drips and white slanting block letters, all done in high gloss commercial enamel paints called One Shot and Ronan. The second group is more restrained in execution, where the width of the background bands is first drawn in pencil, then taped and painted with Golden Matte Acrylic. The mixing of the colors to arrive at a precise hue can take Bochner hours. Although he uses a rather high tack, self-adhesive tape called Shurtape, some seepage can occur, which the artist accepts.⁴⁰

Since Bochner always starts in the top left corner of a painting with the first letter and continues until he has reached the bottom right corner, careful planning of the spacing between letters is essential. Occasionally the letter 'o' needs to grow skinnier to fit in a row. The letters are then sketched with charcoal on top of the matte acrylic bands (oil crayon in the case of the enamel paintings), followed by slowly painting them freehand with a mixture of oil paint, dammar resin, and turpentine. Bochner's degree of control is so exceptional that it is difficult to believe that he uses no aids. But he explained that this process, in comparison to working with tape or stencils



Figure 11. Detail of *Silence!*, with the letter "P" on the left hand edge of the work painted freehand, and taped horizontal lines above and below. Photo by the author, courtesy of the artist.

is much faster, that's the funny thing. My father was a sign painter, so against my will he taught me how to do these things. It wasn't something I wanted to do, all right, so I had that skill, but it's a skill that I spent many years denying. But then slowly it came back to me. To do this with a stencil would take *forever* because you have to wait for each letter to dry. So let's say you painted the "s" in "silence", and then you remove the stencil, you couldn't put the stencil back down to do the "i". The other thing is: the stencil gives you an exact same letter every time, and there's a set of what I call "conditions" in these paintings, where I can get a certain number of letters on each line. But no more.⁴¹

40 Interview between M. Bochner and the author, New York, 11/12/2012.

41 Ibidem.

As intellectual-philosophical as he is in relation to the content of his work, Bochner can be as pragmatic when it comes to technical considerations:

I have no moral or ethical assumptions about using tape, and I can't go down that path. If you're an artist, you use whatever you can, whenever you can, wherever you can, and why ever you think you should. So everything that exists is material, and if you can find a purpose and a meaning for it, then why shouldn't you use it, why would you take some kind of moralistic attitude. I particularly dislike the word "should".⁴²

The following three painters, Ben Johnson, Cipriano Martínez, and Bernard Frize, use not so much proper masking tape—although that too, occasionally—but self-adhesive film cut to their specifications. The London-based Johnson (b. 1946) makes highly creative use of masking film for his detailed, hyperrealistic cityscapes or interiors such as the Alhambra in Granada or the Neues Museum in Berlin. With exceptional dedication and the help of assistants, the process involves preparing countless drawings on the computer, which are then translated into topographical “maps” of the three-dimensional paint surface of the paintings. With a cutting plotter, self-adhesive film is cut into a set of stepped, self-adhesive masks that are used successively on the canvas to slowly build up each shape with acrylic paint.⁴³ Because of the intricate layering, each element's three-dimensional depth is not only suggested in an illusionistic way, but actually realized in paint.

A leitmotif in the work of the Berkshire-based painter Cipriano Martínez (b. 1965) has been the urban landscape of his native Caracas, which in recent years has started to give way to new, more intricate compositions: he is interested in how structures such as modular housing complexes can survive their physical decay through constant adaptation to accidental changes. Maps cannot truthfully render this ongoing process; he bases his geometric derivations on a series of overlaid grids that consist of zones of regularity as well as disruption. Recent prints and paintings start out as line drawings created on a computer, prints of which are then placed on top of Ritrama self-adhesive film. With a scalpel and ruler Martínez cuts the often-triangular pieces and transfers them to the painting by hand at various stages, in a slow and painstaking process. Martínez accepts the long drying time of oil paint because it allows him to maintain some transparency within the often-complex

42 Ibidem.

43 Personal communication between B. Johnson, Robert Bruce-Gardner and the author, London, 18/5/2013.

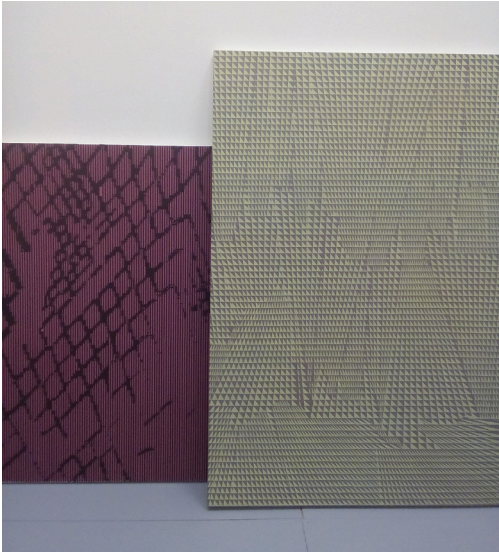


Figure 12. Cipriano Martínez, *Untitled*, 2016, oil on canvas, 140 cm x 100 cm (left) and *Orthodrome*, 2012, oil on canvas, 180 cm x 120 cm (right). Photo courtesy of the artist.

layer structure.⁴⁴ Hardly any two triangles are exactly alike, and the partially mechanized process of their making process reflects the interplay of human, technological, and natural forces at work in the cityscape.

Like Bochner, the French painter Bernard Frize (b. 1949) is known for imposing on himself a system consisting of a set of rules before the production of each painting (or set of paintings). The motivation behind this approach is to outmaneuver any possible Romantic vestiges by artificially limiting subjective expression. The results are lush, brightly colored paintings that only gradually reveal their making. *Aliég*, from 2013, is an example from a recent series that he painted with acrylic on primed and resin-coated canvas,

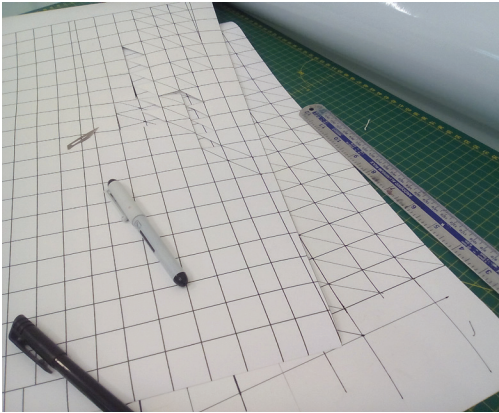


Figure 13. Tools used by C. Martínez in the process of transferring a computer-generated drawing to canvas: ruler, permanent marker, scalpel blade, and Ritrama vinyl self-adhesive film. Photo courtesy of the artist.

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44 Personal communication between C. Martínez, Mario Palencia, and the author, Berkshire, 24/11/2014.



Figure 14. Bernard Frize, *Aliég*, 2013, acrylic and resin on canvas, 162 x 130.5 cm. Photo courtesy of the artist.

and for which Frize had strips of Montex Masking Film cut with a plotter.⁴⁵ The wave pattern of the cut strips is reminiscent of the zigzag line of pinking shears, but he opted for an irregular wave pattern. Fig. 15 shows a test panel for *Aliég* in process, after a first application of paint over the *shablon* (stencil) or “shaped tape”, as Frize calls it.⁴⁶ Once fully dry,

the painted wavy edge is masked in turn and the brushstrokes extended on the other side in another color. Great skill is needed to uphold the suggestion of continuity, as the randomness of the specific striation pattern has to be carefully imitated, leading the traditional veneration of the artist’s gesture as an expression of individuality *ad absurdum*. Frize thus capitalizes on the visual brain’s inability to settle down to a stable state, by introducing the difficulty of processing the curves of the wavy border.

New York-based David Reed (b. 1946), to whom this study is deeply indebted in several respects, is considered a colorist, and best known for the long and narrow paintings that are frequently installed horizontally, but occasionally also vertically. Especially the horizontal formats—Reed calls them screen paintings—are a manifestation of his love of cinema from which he has also adopted visual pacing and the quality of emanating light. Much attention is given to creating a sense of imbalance, disorientation and ambiguity, while maintaining a continuity of color intensity. Each painting is preceded by numerous so-called *Color*

45 Email correspondence between B. Frize and the author, 8/3/2013.

46 Email correspondence between B. Frize and the author, 14/3/2013.



Figure 15. Detail of a 2012 test panel for *Aliég*, with wavy, masked lines between colored fields during painting process. Photo courtesy of the artist.

Studies, in which he works out for instance how the same hue can appear cool or warm, depending on what it is applied to or in the vicinity of: “I want more than ever to have the parts not fit together—to have the painting break apart. To have elements that don’t seem like they should go together, yet be in the painting fighting,

and things appearing out of nowhere. I want all of that in the paintings. I want them to be less resolved than ever”.⁴⁷

Several aspects of Reed’s painting process, with particular emphasis on color choices, have been discussed elsewhere,⁴⁸ but they cannot be dissociated from his intricate taping technique. His tableaux are often divided into rectangular fields, some of which appear to be set into a larger surrounding area: for example in *Color Study #60*, from 2012, both the white and turquoise-colored rectangles are such “cut-outs,” as Reed calls them. His extraordinary gifts both as a craftsman and as a colorist become most apparent at these taped edges, where brush and knife marks can appear continuous, or not, all because of how he handles the paint and which choices he has made in terms of hue, value, and chroma.

Color Study #60 is a preparatory work for painting #617 and comprises the various methods of taping which Reed and his assistants have mastered: the sharpest straight edges for all of the rectangles; wavy outlines of forms as for example in the multi-colored glazed shape to the

47 Reed quoted in: J. Yau. “In Conversation: David Reed with John Yau”, *Brooklyn Rail*, 4/3/2010, www.brooklynrail.org/2010/03/art/in-conversation-david-reed-with-john-yau.

48 “Strange Things Can Happen—David Reed in conversation with Pia Gottschaller”, in: *Heart of Glass. David Reed – Gemälde und Zeichnungen 1967-2012*, exh. cat. Kunstmuseum Bonn, eds. S. Berg and C. Schreier, Köln, 2012, pp. 60-68 (English), pp. 89-112 (German).



Figure 16. David Reed, *Color Study #60*, 2012, 33.7 x 87.6 cm, acrylic, oil, and alkyd on illustration board. Photo by the author, courtesy of the artist.

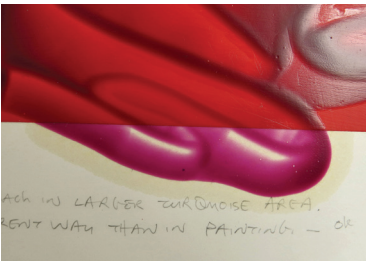


Figure 17. Detail of *Color Study #60*, with taped edges and traces of sanding visible in raking light along the bottom edge. Photo by the author, courtesy of the artist.

right, including the white irregular shape placed on top which was then glazed with magenta-colored paint; and the amorphous squiggles standing proud on top of that shape, which were first painted in white and then covered in scarlet glazes. More than any other painter discussed in this study, Reed has embraced a large variety of tapes, taking full advantage of each product's specific advantages:

Newman often used masking tape that easily allows bleeding. Today we use many different sorts of tape, some of them manufactured only recently. Since I don't want that much bleed, I often use white paper tape that gives a very sharp and clean edge. And if I don't want it to bleed at all, I put a little Liquin (an alkyd medium) over that edge, let it dry, and then paint over it, which gives me an extremely sharp edge. I always long for more pigments, but I never imagined that there could be so many different kinds of tape. There's a blue tape, called painter's tape, which is low tack and doesn't pull up under layers of paint as easily as the white paper tape. And there is Nichiban tape, which is especially made to not pull up what is below it. I love that tape is so ubiquitous. When I give a lecture or teach and mention tape, I always pause at some point to claim: "I'm sure there's some of it around". I can always find some in any classroom or auditorium, holding down electrical cords or patching something, posting a note.⁴⁹

49 Reed quoted in "Strange Things Can Happen", p. 67.

Reed's process involves a lot of revision of a composition by removing already applied paint layers and taped paint ridges with razor blades and sanding, by hand or with power tools. As a result, multiple tapings of edges become necessary throughout the genesis of a work. Low tack blue tape is used for holding down a piece of canvas to a table covered with newspaper; to create the outlines of a wavy shape; or to hold Reed's cuff away from the paint surface. Thin white tape and thicker, high tack white paper tape are used in double layers before the application of acrylic paint. The expensive Japanese Nichiban tape goes only under other layers of tape, and the even narrower, black Letraline tape allows for tricky curves.⁵⁰ But none of this is evident in the final result. The lengthy process is hidden and Reed strives for the paintings to remain open, at the end, where the end can be renegotiated even after a work has left the studio and returned.

Conclusion

All radical innovations seem to undergo a similar process, in the sense that while an innovation gradually gains acceptance, it loses some of its edge and role as a signifier. Although tape for the first 40 years of its existence could have been considered a semantically neutral material, many iconic works created with it have long since entered the canon of art history. To prefer a line painted with masking tape to a line painted freehand now is no longer analogous to preferring handwriting over typing. Other than their first generation modernist predecessors, many abstract artists today are no longer afraid of being labeled "decorative" or "makers of wallpaper." On the contrary, some artists like Martin Creed and Phyllida Barlow make the most of the proliferation of brightly colored and patterned tapes, which in fact are meant to be used for nothing else but decoration, and they become incorporated as compositional elements in themselves, rather than be only used as painting aids.

One of the main issues negotiated in abstract painting today is no longer which strategies serve to avoid subjective or Romantic self-expression. That an artist aims for it is generally a given in contemporary painting. As the practitioners discussed above demonstrate, tape still features centrally in the renewal of painting, but it is being adapted to different, often non-linear effects, with a vast plurality in mind, and as a means to modify the directness of their hand. On this subject the

⁵⁰ Personal Conversation between D. Reed, studio assistants and the author, New York, 10/12/2012.

artist Dan Sturgis eloquently wrote in the catalogue for the exhibition *The Indiscipline of Painting*, which he curated at Tate St. Ives and which included many artists mentioned here:

They reflect a strand of contemporary anxiety that regards the gestural and the idea of self-expression as being in some sense contrived. Even those artists who use what we might call a “painterly” approach to the handling of their material (...) do so in a conceptually detached, or once removed, way. The method is informed by displacement as much as by the corporeal and material. That does not mean that works do not record and trace their making—all of them do. Some exhibit great skill and dexterity, others a much more mundane or commonplace style of making. Some hold great speed within their manufacture and others slowness or even timelessness. The way that time is held in the making of a painting—and its viewing—is something that has always fascinated me. (...) How paintings can hold time or be outside of time, or indeed just out of time.⁵¹

In 2014, *The New Yorker* magazine ran an article that described how Andre Geim, a physics professor at the University of Manchester, managed to isolate graphene, the first two-dimensional material. He achieved this feat by adhering graphite to self-adhesive tape and “by folding the tape, pressing the residue together and pulling it apart, he was able to peel the flakes down to still thinner layers.”⁵² The world of science discovered a stunningly simple yet unique application of tape, in this case Scotch tape, as low-tech as can be, to create a revolutionarily thin layer of carbon. In the visual arts, tape, more often than not, generates a degree of three-dimensionality, rather than thinness, but it should not be considered any less groundbreaking in the role it plays in effecting our consciousness.

51 D. Sturgis. “The Indiscipline of Painting,” in: *The Indiscipline of Painting*, eds. M. Clark, S. Shagolsky, D. Sturgis, exh. cat. Tate St. Ives, London, 2011, p. 12.

52 J. Colapinto, “Material Question”, *The New Yorker*, 22&29/12/2014, p. 50.