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A Sense and Essence of Nature: Wave Patterns in the Paintings of František Kupka

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6 A Sense and Essence of Nature: Wave Patterns in the Paintings of František Kupka

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The Czech painter František Kupka is a co-founder of modern abstract art along with Piet Mondrian, Kazimir Malevich and Wassily Kandinsky. Although the least known of this group, Kupka was the first to exhibit an abstract painting publicly in the fall of 1912; in fact, two abstract paintings were shown by Kupka that year, *Vertical Planes I* and *Amorpha, Fugue in Two Colours*. They were the culmination of a long process dating back to 1904 and, arguably, even further back to 1894 when Kupka was living in Vienna.¹ The 1912 paintings embody Kupka's almost single-minded pursuit of the fundamental elements that make up our world, all of which, according to the artist, share a common feature, namely their vibratory nature. The following discussion examines the nature of Kupka's 'vibratory modernism' and its origins in the science and mysticism of the nineteenth and early twentieth century.

Kupka's embrace of abstraction was rooted in a fundamental insecurity as to the purpose of painting that dated back to 1894 and was largely caused by the advent of photography. The relationship between art and nature was redefined by photography, undermining the mimetic role painting had assumed since the seventeenth century. Surprisingly, Kupka's shift to abstraction did not involve a total abandonment of nature, rather it moved from the representation of nature's appearance to looking at its basic underlying structure and laws. This change of focus on Kupka's part directed him to the physical sciences. It was a change that might have seemed unusual at first since Kupka was something of a spiritualist who embraced theosophy and even practiced as a medium while in Vienna.² However, theosophy likely suggested the scientific path Kupka would take by 1904. Theosophy itself turned to the sciences for proof of the existence of a higher spiritual reality and the latter provided evidence that could be interpreted as such.³

Multidimensional spaces, the ether, electromagnetic phenomena, and so on, all seemed, to many spiritualists (as well as some noted scientists like Oliver Lodge), to confirm the existence of higher spiritual realms.

An important catalyst for Kupka's turn to the sciences was the work of the Austrian physicist and philosopher of science, Ernst Mach.⁴ What attracted Kupka to Mach was not so much his description of the physical world, but rather how our knowledge of it is acquired.⁵ Part of Kupka's re-questioning of the role of painting involved an examination of our relationship to the world – how do we perceive it, how do we come to understand it. For Kupka, a painter, Mach's theories of sensations, which are fully expounded in his 1886 text *Contributions to the Analysis of the Sensations*, was the perfect bridge between art and the sciences.

The parallels between Mach and Kupka are uncanny, as I have discussed at some length elsewhere.⁶ The painter's work from about 1900 onwards demonstrates a thorough understanding and adoption of Mach's theory of sensations. In *La Création*, Kupka supplies a specific account of how sensations and their organisation function in the arts. In general terms, the artist must first struggle with the numerous impressions his senses receive; s/he must disentangle these and make sense out of them. Then the artist must elaborate upon these sense impressions by introducing a certain structure or logic to them.⁷ Finally, s/he must move towards objectifying these sensations and give them material form, that is, produce a work of art. But as simple as is Kupka's description of the creative process, unravelling it and making sense of each of its component parts is another, more complex, matter.

As is obviously the case with Mach, nature plays a fundamental role in the creative process for Kupka. Firstly, nature provides the starting point since it is the material upon which our senses act and thus represents the catalyst of the creative process. As Kupka noted: 'The work of the artist consists ... in controlling the subjective elaboration of ideas originating from the observation of the vital mechanism.'⁸ But, more importantly, nature is also the model for creativity itself: the artistic process, for Kupka, must parallel the creative forces in nature. As he wrote in *La Création*:

The objective world, the great theatre of nature, directs the structure of organized matter ... Let painters and sculptors try to imitate it. Let their gaze penetrate beyond the surface...⁹

The importance of this has to be stressed since, here, nature essentially represents the content of the work of art for Kupka.¹⁰ That content is in

itself the central element of the creative process in art, namely that art's role lies in revealing and paralleling the invisible laws of nature, laws which are an integral part of our own human psyche. As Kupka wrote: 'as a sensitive being open to all impressions, the artist experiences within himself the movements and events of the whole universe'.¹¹ The justification for this lies again with the fact that since we are an indivisible part of nature, it is only reasonable that an artist's creation should parallel the creative forces of nature. This, in part, explains why Kupka could also state that 'there exists, within the artist, the will to recreate the universe'.¹²

Kupka saw the creative forces of nature as essentially logical and, consequently, this became the basic parameter for artistic creation; as he exclaimed: 'create as logically as does nature!'¹³ He warned that if art did not follow 'the logic of natural forms, disastrous effects show clearly'.¹⁴ Thus nature acts as a crucial controlling element in the process of artistic creation, a type of structural scaffolding without which artistic expression is impossible. For Kupka, that structure is essentially mathematical:

The imagination is composed integrally of registered perceptions and furthermore requires a permanent control, empirical or mathematical, a continual confrontation with objective reality, without which madness lies in wait.¹⁵

Again, this idea is derived from Mach, although there is a likely influence from the French mathematician and philosopher of science Henri Poincaré as well, who taught Kupka at the Sorbonne in 1905 where the painter attended classes in biology, physics, and physiology.¹⁶ Mach's initial influence led to Kupka immersing himself in the sciences upon his arrival in Paris. Like Mach, Poincaré saw the study of nature based on an examination of functional relationships between elements. But the above passage indicates clearly that Mach was at least the initial source for Kupka's belief in the necessity of a mathematical or empirical structuring of ideas, especially considering that Poincaré did not adhere to Mach's theory of sensations.¹⁷

Kupka endorsed Mach's general description of the process of the acquisition of knowledge through sensation, but he faced the problem of how to manifest it in painting. The solution came with the development of an abstract language. By 1904, Kupka finally began to devote his attention more fully to painting after having almost abandoned it after 1896 due to the struggles he was having justifying its continued

existence with the emergence of photography which engendered his turn to the sciences. Although he had begun to outline the new direction his art would take by 1904, it did not result immediately in an abandonment of the figurative; however, it underwent a crucial transformation. As of c.1907, figures in Kupka's paintings no longer existed as physical entities, but rather as component parts of the painted image as a whole.¹⁸ At times the figure became integrated almost to the point of ornamentation. This was certainly intentional; on one of the drawings of the *Three Studies after Girl with a Ball* (1908–09), Kupka inscribed: 'there is here but//the dissection//of surfaces//the concept//of//atmospheric//co-penetration'.¹⁹ The reasoning behind this merging of figure and space emanated from Kupka's belief in the intrinsic unity between nature and the self, or, as Kupka put it, the 'conscious solidarity of our individual self ... with the immense universe'.²⁰ This was a theme which was already present in earlier symbolic works such as *Ballads – Joys* (1901–02), but there the meaning lacked clarity due to the rather obscure symbolism. In *Water – Bather* (1906–09) the theme is represented in a more explicit and simple way, where the bather is literally immersed in nature.

The merging of figure and space is the focus of a series of studies entitled 'Woman Gathering Flowers' (1908–11), which culminate in the 1910–11 work *Planes by Colours*. Significantly, this work represents one of the first examples of a visible scientific influence on Kupka's painting. As Linda Dalrymple Henderson has shown, *Planes by Colours* incorporates X-ray imagery in the depiction of the nose of the female figure, where Kupka shows it as a shadowed image closely parroting the rather unique image of the hollow cavity of the nose found in X-rays.²¹ But, according to Henderson, this copying of a scientific image proved unsatisfactory for Kupka because it was too literal, in other words, too illustrative, thus simply repeating painting's mimetic tradition. Nevertheless, it appears to have drawn Kupka's attention to electromagnetic theory, an interest that Henderson believes would be reflected only in later works.²²

Henderson's discovery of the use of X-ray imagery is a crucial element linking Kupka's work to science, but another is suggested by the most distinctive feature of *Planes by Colour*: the use of coloured planes. In *La Création* Kupka noted that coloured planes can generate a sensation of vibration ('modulation'):²³

Moving from lights to darks, each colour scale produces a composite impression, where distinct vibrations are juxtaposed. It is a game of

cymbals, where the metallic discs, arranged according to scale, each vibrate and generate a specific sound. Here, as always and everywhere, nature teaches us admirably.²⁴

Vibration or waves represented for Kupka one of the fundamental manifestations of energy in nature: 'The radiation of the vital energy found in nature ... always manifests itself in terms of relationships between different vibrations.'²⁵ This belief is expressed in a number of Kupka's early works. For example, such symbolic works as *The Wave* (1902) and *Water – Bather* which deal primarily with the notion of spiritual rebirth through a communion with nature, also demonstrate a fascination with the vibration or movement of water. In fact, this interest might complement the symbolic meaning of these works. As both these images focus on women, Kupka may be drawing a parallel between the popular notion of a woman's biological functions determined by lunar cycles and the gravitational influence of the moon on tides. Such an interpretation seems reasonable given Kupka's belief that we are inextricably a part of nature.

The theme of vibration or wave-like phenomena is an important component of *Piano Keys – Lake* (1909). The top part of this work presents a lake scene, while the bottom shows a pair of hands playing some melody on the keys of a piano. Where the two merge results in an abstract vertical colour pattern. Here it is clear that Kupka is drawing a parallel between sound waves and the waves produced on the surface of water. That such a parallel should be drawn is intimated by the title of the work. The colour pattern itself represents a painterly expression of this shared characteristic, where its form adheres to the parameters of the medium (the rectilinear format of the canvas), while also introducing colour as another wave-like manifestation as was first suggested by Leonardo da Vinci – an artist whom Kupka greatly admired.²⁶

The fact that an abstract vertical motif is used in *Planes by Colours* clearly suggests that some sort of wave-like phenomenon is at the basis of this image. It has been suggested that this work is derived partly from the French photographer Jules-Etienne Marey's motion studies, since the figure in *Planes by Colour* is depicted in movement: where the left arm swings inward towards the body and the head appears to turn clockwise.²⁷ But Kupka may have simply interpreted bodily motion as generating another form of vibration, namely that of the displacement of air caused by the movements of the figure. This could be an example of what Kupka termed 'atmospheric co-penetration', of the integration of figure and space or, as he stated in *La Création*,

an illustration of the fact that 'form is inseparable from its setting'.²⁸ The colour planes may also embody the theosophic belief that our bodies emit spiritual auras. This is certainly a possibility although in C.W. Leadbeater's *Man Visible and Invisible* (1902) these auras project in a different fashion from Kupka's vertical colour planes.²⁹ However, this should not preclude a connection between aural emanation and Kupka's coloured planes, since Kupka may have simply thought it more reasonable to assume that auras propagate in waves.³⁰ Thus, the vertical colour planes in *Planes by Colour* can be interpreted as expressing both the co-penetration of figure and space and the emanation of one's spiritual aura, as well as incorporating possibly the different wave-like phenomena expressed in *Piano Keys – Lake*.

The synthesis of the different wave-like phenomena expressed in *Planes by Colour* may yet include another complementary element. This is suggested by Kupka's literal use of an X-ray image. He may have used this image simply because it could be recognised easily and thus prompt further inquiry as to the reasons for its inclusion. Anyone familiar with X-rays would immediately recognise the connection between X-rays and the coloured vertical planes: the inference being that these planes are referring to Fraunhofer lines.³¹ Kupka was certainly aware of Fraunhofer lines, also known as the chemical spectrum. In speaking of colour vibrations and the visible spectrum in *La Création*, Kupka also noted,

Black bodies ... absorb everything. For the physicist or the photographic plate it represents an absence of light, and for our retina, it gives the impression of contrasting with luminosity where colours radiate in terms of more or less rapid vibrations.³²

In mentioning black bodies (which absorb all radiation and thus, when hot, emit radiation of all wavelengths), photographic plates and physicists together, Kupka is obliquely referring to the invisible spectrum, that is, the chemical spectrum, where the colours are invisible because they are beyond the range of the visible spectrum. Not surprisingly, the reason for this inclusion on Kupka's part is because Fraunhofer lines, when recorded, appear as vertical coloured lines, indicating the presence of certain chemical elements based on the wavelength of radiation emitted.³³

What source Kupka may have drawn upon to learn about this phenomenon is impossible to establish exactly. Scientific sources are the most logical point of departure. Obviously, whatever texts he read

on X-rays would have discussed the chemical spectrum. Mach is one possibility – he mentions the chemical spectrum in his discussion on colour in the *Analysis of Sensations*.³⁴ Another source might have been Henri Poincaré, one of the few scientists referred to by name in *La Création*.³⁵ But the spectrum was also discussed widely in non-scientific journals. One finds, for example, in the *Mercure de France*, the following description written in 1911:

Everyone knows that white light decomposed by the prism forms a spectrum which, for our eye, extends from red to violet; but beyond this the spectrum continues by invisible rays which are revealed by their action on the photographic plate.³⁶

Another potential source are mystical writings. As was the case with X-rays, the chemical or invisible spectrum was felt by spiritualists to confirm a number of their beliefs.³⁷ There are a plethora of other potential sources: in fact, they are so numerous that it is difficult to imagine Kupka not having known of Fraunhofer lines.

The inclusion by Kupka of the chemical spectrum in *Planes by Colour* suggests further refinements in terms of how the image should be read. It was mentioned earlier that the motion of the figure in *Planes by Colour* generated a wave pattern in terms of the displacement of air. Kupka may have been a bit more specific: the motion of the figure may have been causing a displacement in the 'ether'. The ether was postulated as the medium through which such phenomena as electromagnetism, light, radiation, and so on, were propagated. It was believed by scientists, though never proven, that such a medium had to exist since these manifestations could not occur in empty space. This notion of the existence of an ether was popular particularly in the nineteenth century, but persisted well into the twentieth century. For example, the author of the *Mercure de France* passage discussing the chemical spectrum above added that the invisible rays revealed by spectral analysis manifest themselves in terms of 'waves in the ether'.³⁸ Theosophy adopted the concept of the ether as well and used it in much the same manner as science, defining it as the carrier of spiritual energy. The ether served as an important link between spiritual reality and the material world.³⁹

The ether was also a popular concept amongst artists. Within Kupka's own circle, we find artists and writers as diverse as Guillaume Apollinaire, Henri Barzun and Robert Delaunay, all referring to it in one form or another.⁴⁰ That Kupka himself was aware of the concept of the ether is revealed in *La Création*, where we find him speaking of

'waves which propagate themselves through the atmosphere – or the "ether"'.⁴¹ His use of it certainly makes perfect sense within the context of the different wave-like phenomena *Planes by Colours* encapsulates. In fact, the inclusion of the ether ties together the various elements presented in *Planes by Colour*, since it is the medium that carries the vibrations of colour, sound, radiation, and spiritual auras.

The work Kupka had done leading to and including *Planes by Colour* represents a visual equivalent to the initial phase of the theoretical approach Kupka had derived from Mach. It embodies Kupka's attempt to identify and define in painterly terms a fundamental component of natural reality; in this case, the manifestation of natural energy in terms of waves. To a large extent the paintings discussed above represent an experimental ground: as Kupka remarked to Arthur Roessler, 'one has to work on a problem for years in order to produce a sketch, a viable study'.⁴² What one expects to find next is a move on Kupka's part towards an abstract formulation of his belief that all energy in nature expresses itself in terms of waves. Kupka does not disappoint us.

The abstract formulation of wave motion is announced early in *Piano Keys – Lake* with the vertical pattern found at the point where the lake and piano converge. The gradual abandonment of the figurative begins in earnest with *Madame Kupka among Verticals* (1910/11–20), where only Madame Kupka's face is discernible amongst a multitude of coloured vertical strokes. Increasingly, the figurative is eradicated totally, as in *Arrangement of Verticals* (1911/12–20). The latter painting undertakes further steps in the refinement of the abstract representation of wave motion. A key element in the process of abstract conceptualisation for Kupka was that the image had to replicate the sensation of the object(s) from which it was derived. This is what Kupka appears to be doing in *Arrangement of Verticals*. The 'arrangement', or composition, of the verticals in this work mimics the basic up and down motion of a wave.

Arrangement of Verticals not only reformulates the abstraction of wave motion in sensory terms, but also initiates a process of simplification and clarification which culminates in *Vertical Planes I* (1912). Against a simple blue background, Kupka presents in *Vertical Planes I* an arrangement of seven planes whose composition recalls the motion photographs of a bouncing ball.⁴³ Various descriptions and comments on this work suggest that it has succeeded in transmitting the sensation of movement it is meant to encapsulate. Margit Rowell has linked *Vertical Planes I* to Marey's motion studies, while Virginia Spate sees it as representing 'waves in space'.⁴⁴ As we have seen, these interpretations are

all essentially correct, although they fail to identify the crucial process reflected in the genealogy of this work.

Beginning with *The Wave* in 1901, we have a visual working-out of the process Kupka described in his writings: that of the move from an instinctual understanding of reality to an abstract conceptualisation. *Vertical Planes I* represents the expression of wave motion found in nature in its purest painterly form. There is no longer any references to specific wave-like phenomena, rather *Vertical Planes I* synthesises into one basic form and sensation, light waves, electromagnetic waves, spiritual auras, sound waves, waves on the surface of water, and possibly even brain waves, since Kupka also maintained that electrical impulses conduct information to our brain.⁴⁵ It should then come as no surprise to find Kupka referring specifically to those planes as 'planes of force' in a study for *Vertical Planes I*, thus representing the basic abstracted form of the energy which permeates nature.⁴⁶

The series of works that conclude with *Vertical Planes I* provides a unique glimpse of the process of abstract conceptualisation at work in Kupka's paintings. It is unique for the simple reason that it is an experimental phase which occurred at the time Kupka was outlining his theoretical approach to painting. Once the experimentation was over, his future works would dispense with such an overt enactment of what was meant to be an internal process. This is not to say that later abstract works would not refer back to earlier compositions; rather, the visual traces of their history would never be as explicitly laid out as it was in *Vertical Planes I*.

Kupka continued to experiment with different pictorial forms in order to better capture the idea of nature expressing itself in terms of waves. Thus *Vertical Planes I* spawned *Vertical Planes II* (whereabouts unknown) and *Vertical Planes III*, while such works as *Compliment* (1912, 1919–22: Musée National d'Art Moderne, Paris), *Strokes, Planes, Space III* (1913–26: Musée National d'Art Moderne, Paris) and *Moving Blues* (c.1925–27: Private Collection, Paris) will each pursue in their own manner the theme encapsulated in the *Vertical Planes I*.

Kupka did not limit himself to exclusively examining one form or aspect of nature. While pursuing the series of works which resulted in *Vertical Planes I*, his attention was drawn to astronomy. This interest engendered a new direction for Kupka, one which began essentially with *The First Step* (1909) and culminated in *Amorpha, Fugue in Two Colours* (1912). Stylistically, *Vertical Planes I* and *Amorpha* are markedly different, but the process involved in their creation is the same.

As was the case with *Vertical Planes I*, *Amorpha* has its roots in a number of earlier images which can be traced back as far as 1900. It essentially draws from Kupka's motion studies of his daughter playing with a ball, resulting in the red and blue arabesque in the foreground. The two large cropped orbs are taken from astronomical studies, and are particularly inspired by Poincaré's assertion that two-thirds of stars are binary. Thus the sources for both *Vertical Planes I* and *Amorpha* are initially figurative. Each is based on one central theme or subject – the former, wave patterns, the latter, motion in general – whose various manifestations are explored in a series of works leading up to their creation. Finally, both images represent an abstract formulation which purports to embody the essential components of that theme. And like *Vertical Planes I*, *Amorpha's* abstract imagery also embodies a sensory dimension. The red and blue curvilinear motif engenders a sense of dynamic and almost effortless movement within the viewer, while the orbs transmit a feeling of massiveness. Basically, Kupka wants to trigger a physical sensation of motion within the viewer, who would in turn associate that sensation with the movement of the celestial spheres.⁴⁷

It could be argued that Kupka was focusing on a different aspect of nature in *Amorpha* as opposed to the wave-like phenomena abstracted in *Vertical Planes I*. And yet, wave motion is simply one form of movement. Thus *Vertical Planes I* and *Amorpha* may be dealing with the same thing, although approached from different angles. This is suggested by the fact that bodily movement is a component of *Vertical Planes I* (via its association with *Planes by Colour*), while *Amorpha* may also include electromagnetism as an element of its imagery, which was believed to manifest itself as waves in the ether.

An important precursor of *Amorpha* is *Amorpha, Warm Chromatic* (1911). Henderson argues that it incorporates electromagnetism in its use of blue-violet and red. These colours were believed, according to the occultist Albert de Rochas, to be the colours which emanate from the extremities of magnets.⁴⁸ Assuming that Henderson is correct, and given that *Vertical Planes I* does include bodily motion as generating waves, then *Vertical Planes I* and *Amorpha* are not as distinct from each other as their contrasting styles suggest. Both express the basic energy, that is, movement, which composes our visual reality and, potentially, our spiritual reality. In a sense, then, Kupka is dealing with similar themes in both works but experimenting with different forms, attempting possibly to find the one form that could best encapsulate the sensation he wanted to transmit.

The various themes Kupka dealt with in *Vertical Planes I* and *Amorpha* were eventually combined in one image, which suggests once again that their respective imagery are fundamentally related. *Around a Point* (1911/1927–30), which has been described as the consummate expression of Kupka's vision, embodies the notion discussed earlier of abstraction building upon abstraction.⁴⁹ It represents Kupka's continuing desire to formulate a more complete composite image of reality. Its specific genealogy is now rooted in a series of abstract images or formulations, rather than specific figurative works. It builds upon the abstract formulas devised in *Vertical Planes I* and *Amorpha*, while also incorporating other novel images which were developed concurrently. As expected, it appropriates the different themes of the images it is based upon and, consequently, its interpretation becomes more complex.

Around a Point reprises the theme of wave motion expressed in *Vertical Planes I*, but in the more familiar circular pattern. Kupka used such a pattern in *Newton's Disks* (1911–12) where he experimented with the wave theory of light and examined the interference patterns which result.⁵⁰ *Around a Point* also incorporates the theme of universal gravitation found in *Amorpha*, as its circular pattern refers to the orbital movement of planets.⁵¹ Thus, Kupka appears to have settled on a circular pattern as a more comprehensive and universal form for expressing movement.

Around a Point also introduced another theme, specifically a floral theme related to sexual reproduction. In 1919, Kupka undertook a series of paintings entitled 'Tale of Pistils and Stamens'. These works represent an abstract reinterpretation of the reproductive organs of plants. That the theme involved is primarily sexual can be inferred from the following passage found in *La Création*:

Each plant covers itself with flowers which it raises to daylight. The stamens with their exuberant phallic forms fertilize the gracious pistils.⁵²

On one level, *Around a Point* is related to 'Tale of Pistils and Stamens' in formal terms. But more importantly is the question of how the theme of sexuality relates to those appropriated from *Vertical Planes I* and *Amorpha*. The justification rests again with theosophy, where we do find a parallel drawn between sexual reproduction and planetary motion: as the theosophist Stanilas de Guaita observed, 'the same law controls the communion of the sexes and the gravitation of the suns'.⁵³ By adopting the reproductive organs of plants in 'Tale of Pistils and Stamens', Kupka can make this connection between sexual reproduction and the

movement of planets almost literal, since plants depend on the sun for their existence.⁵⁴

During the course of working on *Around a Point*, Kupka integrated the model of the atom as part of its subject matter as well. It is difficult to pinpoint exactly when Kupka became familiar with the theory of the atom, but there can be little debate as to the attractiveness such a theory must have had for him. Again the sources are too numerous to identify any specific one which Kupka might have drawn upon. What was surfacing in popular journals, though, would have provided sufficient information to make the atom an attractive element for Kupka to incorporate in his work. For example, Georges Matisse's article 'La Théorie moléculaire et la science contemporaine', published in *Mercure de France*, describes the atom as a miniature planetary system charged with electricity and expressing itself as a turbulent movement of the ether.⁵⁵ That the atom paralleled the solar system in its form, was charged with electricity, expressed itself in terms of vibrations in the ether, and represented for science the fundamental element of all matter, ideally satisfied all the criteria Kupka had established for the subject matter of his work. His awareness of the atom and its relevance to *Around a Point* is confirmed in *La Création* where, in a section dealing with 'Le Point', Kupka wrote:

Contemplating the night sky, filled with stars, one often thinks of the universe as just a mass of points. The suns and the satellites, ovoid spheres, rings, nebulae and comets that populate infinite space, as astronomy describes it, all of this, to our eyes, simply represents a mass of bright points. On the other hand, other small points, observed with a microscope and that science tells us are part of an infinite multitude of molecules and atoms, even smaller points, become, to the naked eye, bodies, articulated organisms.⁵⁶

There can be little debate as to the fact that this passage either inspired *Around a Point*, or that *Around a Point* was its source of inspiration. Kupka populates this work with references to the biological, the atomic, and the astronomical, all of which combined together fulfilled his desire to represent the whole of nature in the simplest form possible. Ultimately, *Around a Point* characterises one of Kupka's more fascinating attempts at answering what appears to have been the two guiding questions for all his artistic experiments; namely, the fundamental structure of the world around us and our relationship to it, questions in which wave motion or the vibratory played a huge role. The painting also represents the

culmination of a fascinating journey from a crisis in the last decade of the nineteenth century when Kupka almost abandoned painting completely to a path that saw him mine the sciences in his desire to redefine the role of art at the turn of the century. Kupka explored what he felt were some of the basic elements of our world as conveyed by science, translating them into painting, resulting in a completely new form of expression in art, abstraction. What his works came to communicate was how nature manifests itself largely through waves, in a manner that could be physically sensed.

Notes

1. Meda Mladek has done some seminal work on Kupka's early career; see 'Central European Influences', in *František Kupka 1871–1957: A Retrospective* (New York: The Solomon R. Guggenheim Museum, 1975) and 'L'acheminement de Kupka vers une réalité nouvelle', in *František Kupka 1871–1957, ou l'invention d'une abstraction* (Paris: Musée d'art moderne de la Ville de Paris, 1989).
2. On the role of theosophy in Kupka's work, see Mladek, 'Central European Influences', p. 29; Virginia Spate, "'L'Homme est la nature prenant conscience d'elle-même": spiritisme, anarchisme et érotisme dans l'oeuvre de Kupka', in *František Kupka 1871–1957, ou l'invention d'une abstraction*, p. 15; and Virginia Spate, *Orphism: The Evolution of Non-Figurative Painting in Paris 1910–1914* (Oxford: Clarendon Press, 1979), p. 131.
The actual extent of theosophy's influence on Kupka is difficult to ascertain partly because Kupka rarely acknowledged specific sources in his writings. Philippe Dagen, though, has discovered at least one passage from H.P. Blavatsky's *The Secret Doctrine* copied in a Kupka manuscript. See Dagen's preface to František Kupka's *La Création dans les arts plastiques* (Paris: Editions Cercle d'Art, 1989), p. 29 [hereafter referred to as *La Création*].
3. Linda Dalrymple Henderson, 'Mysticism and Occultism in Modern Art', *Art Journal* 46(1) (1987): 6.
4. John T. Blackmore's *Ernst Mach: His Work, Life, and Influence* (Berkeley, Los Angeles and London: University of California Press, 1972) remains the most complete biography of Mach.
5. Dagen is the only other scholar to have identified Ernst Mach as a potential source for Kupka's art and theory. Dagen examines Mach's *Knowledge and Error* (1905), a lesser-known text, in relation to Kupka's artistic theory. Dagen, 'Preface', pp. 21–4.
6. John G. Hatch, 'Nature's Laws and the Changing Image of Reality in Art and Physics: A Study of the Impact of Modern Physics on the Visual Arts, 1910–1940', (PhD diss., University of Essex, 1995), pp. 32–119.
7. Kupka, *La Création*, p. 236.
8. *Ibid.*, p. 236.

In another passage, Kupka wrote: 'In order to express faithfully what he feels ... the artist must only refer, logically, to those same objective realities which initiated a subjective reply on the part of the artist'. *Ibid.*, p. 244.

9. *Ibid.*, pp. 114–17.
10. This is essentially the point made by Kupka in *La Création* (pp. 238–43), where he specifically observes that '... with all artists – the pseudo-reality of the objective world is both the instigator and source of creativity'. *Ibid.*, p. 242.
11. *Ibid.*, p. 207.
12. *Ibid.*, p. 164.
13. *Ibid.*, p. 120.
14. František Kupka, 'The Inevitable Division', in Ludmila Vachtová, *Frank Kupka* (London: Thames & Hudson, 1968), p. 286.
15. Kupka, *La Création*, p. 249n.
16. Ludmila Vachtová, 'The Other Reality with a Claim to Universality', in *František Kupka: The Other Reality* (Cologne: Galerie Gmurzynska, 1995), p. 15.
17. The importance of mathematics to the creative process is highlighted by the fact that Kupka used integral calculus in one of his lectures on the psychology of creation given at the Prague School of Fine Arts in Paris. See Vachtová, *Frank Kupka*, p. 260.
18. Spate, "'L'Homme est la nature prenant conscience d'elle-même'", p. 19.
19. Cited in *František Kupka 1871–1957: A Retrospective*, p. 116, catalogue entry for ill. no. 32b [my translation].
20. Cited in Spate, *Orphism*, p. 105. It also ties in with Kupka's notion that the language used in painting must adhere to the basic parameters of the medium: a lesson Kupka drew from nature.
21. Linda D. Henderson, 'Kupka, les rayons X et le monde des ondes électromagnétiques', in *František Kupka 1871–1957, ou l'invention d'une abstraction*, p. 51. Henderson points out that the discovery of X-rays in 1895 had an important impact on the public in general. It generated a series of popular articles which dealt with how X-rays demonstrate the inadequacy of our visual perception. She also points out that a wealth of mystical writings emerged which interpreted X-rays as substantiating the existence of the spiritualist's universe. Thus X-rays were believed to provide objective and scientific support for spiritualist claims. See Linda D. Henderson, 'X-Rays and the Quest for Invisible Reality in the Art of Kupka, Duchamp and the Cubists', *Art Journal* 47(4) (1988): 325–6.
22. Henderson, 'Kupka, les rayons X et le monde des ondes électromagnétiques', pp. 53–4.

Kupka could have become familiar with X-ray imagery either through spiritualist texts and/or scientific writings in developing his own visual and iconographical interpretation of X-rays, namely as an illustration of the contrast between external reality and internal form. See Henderson, 'Kupka, les rayons X et le monde des ondes électromagnétiques', pp. 53–4.

As perceptive as Henderson's analysis of *Planes by Colour* is, this painting has much more to reveal about Kupka's use of science. Henderson tends to overemphasise the role mysticism plays in Kupka's work. She interprets Kupka's appropriations from science as derived largely from mystical sources which, in turn, supply the justification for their use. This runs contrary to

Kupka's stated purpose of adopting an anti-metaphysical or more pragmatic position with regards to his art, one which I believe Kupka never lost sight of (see Hatch, 'Nature's Laws', pp. 34–36). I do not think that Henderson's analysis is wrong, but her emphasis on mysticism has to be tempered somewhat.

23. Kupka, *La Création*, p. 177.
24. *Ibid.*, p. 179.
25. *Ibid.*, p. 141.
26. It might be argued that vertical planes are not an adequate approximation of the waves seen on the surface of water. But Kupka records the waves in terms of their up and down motion along a longitudinal axis, rather than the more familiar circular pattern. This may have been dictated by the medium, where painting has traditionally presented cross-sectioned rather than overhead views. See M. Lamač, 'Un univers nouveau', in *František Kupka 1871–1957, ou l'invention d'une abstraction*, p. 8.
27. Margit Rowell, 'František Kupka: A Metaphysics of Abstraction', in *František Kupka 1871–1957: A Retrospective*, pp. 49–67.
28. Kupka, *La Création*, p. 182.
29. Illustrated in, Sixten Ringbom, 'Art in "The Epoch of the Great Spiritual": Occult Elements in the Early Theory of Abstract Painting', *Journal of the Warburg and Courtauld Institutes* 29 (1966): plate 67b.
30. It does appear that Kupka had adopted a closer variant of Leadbeater's description in some earlier works. The three versions of *Woman Gathering Flowers* belonging to the Musée National d'Art Moderne in Paris show a development from a type of aural emanation akin to Leadbeater's description (see also Kupka's *The Tango* (1909)) towards a reformulation similar to that found in *Planes by Colour*.
31. Henderson does not draw the parallel between the chemical spectrum and Kupka's *Planes by Colour*, despite discussing the possible use of Fraunhofer lines in a number of Cubist works. See Henderson, 'X-rays and the Quest for Invisible Reality', pp. 335–6.
32. Kupka, *La Création*, p. 137.
33. It is interesting to note with regard to radiation that the colour used in the 'Woman Gathering Flowers' studies has a certain phosphorescent quality. Kupka is known to have seen a Crookes tube in a Parisian laboratory (Vachtová, *Frank Kupka*, p. 26). This tube contains a gas which when subjected to an electrical discharge causes energy (radiation) to be released from the electrons of the gas. This energy produces phosphorescent effects on the glass walls of the tube whose colour varies according to the gas present in the tube (this is exactly the principle involved in neon lights). Interestingly enough, these effects are the source of X-rays. It is quite possible that the phosphorescent quality of Kupka's colours in *Woman Gathering Flowers* was suggested by the Crookes tube.
34. Ernst Mach, *The Analysis of Sensations and the Relation of the Physical to the Psychological*, 5th edn (Chicago and London: The Open Court Pub. Co., 1914), pp. 103–4 (hereafter referred to as *Analysis of Sensations*).
35. Kupka, *La Création*, p. 160.
36. Cited in Spate, *Orphism*, p. 23.
37. Henderson, 'X-Rays and the Quest for Invisible Reality', p. 335.
38. Cited in Spate, *Orphism*, p. 23.

39. Henderson, 'Mysticism and Occultism in Modern Art', p. 6.
40. References to the ether can be found in Guillaume Apollinaire's *Tendre comme le souvenir* (1918), Henri Barzun's poem 'Apotheose des forces' and Robert Delaunay's *Du Cubism a l'art abstrait* (1957).
41. Kupka, *La Création*, p. 255.
42. Letter to A. Roessler, 18 February 1913; cited in Mladek, 'Central European Influences', p. 32.
43. Kupka pushed this simplification even further in *Vertical Planes III* (1912–13), limiting himself to three planes. This formulation though does not succeed in conveying as dynamic a sense of movement as the first version.
I should add that because the physical sensation generated by Kupka's works are so important to their interpretation, I have refrained from discussing *Vertical Planes II* which has been lost or destroyed.
44. Spate, *Orphism*, pp. 138–9; Rowell, 'František Kupka', pp. 49–67.
45. Kupka in fact uses the term 'décharge électrique' in describing how our sensations are transmitted by electrical impulses through our nerves to the brain. See Kupka, *La Création*, pp. 84 and 86.
46. *František Kupka 1871–1957: A Retrospective*, p. 188, catalogue entry for illustration no. 96.
47. The presence of the term 'Fugue' in the title of *Amorpha* has led to some debate. It suggests obviously a musical association, but one which Kupka would later dismiss. Kupka enjoyed music greatly and admired its abstract form, but he always pointed out that painting should not imitate music; Kupka believed nonetheless that painting should emulate the abstract structure and logic of music. See K. Passuth, 'Kupka et la naissance de l'abstraction', in *František Kupka 1871–1957, ou l'invention d'une abstraction*, p. 1.
One thing which the musical analogy does possibly suggest is a link to Johannes Kepler's music of the spheres. This seventeenth-century astronomer, who laid the foundation for Newton's laws of gravitation, endorsed Pythagoras' notion that celestial bodies generated certain musical chords in their course through space. Given the astronomical theme in *Amorpha* and the use of the term 'Fugue' in its title, there is a strong possibility that Kupka wanted his work to suggest this idea of the music of the spheres.
48. Henderson, 'Kupka, les rayons X et le monde des ondes électromagnétiques', pp. 53–4.
49. Rowell, 'František Kupka', p. 79.
50. Lamač, 'Un Univers nouveau', pp. 9–10; Mladek, 'Central European Influences', p. 20.
51. Denise Fédit, *L'Oeuvre de Kupka* (Paris: Musée national d'art moderne, 1966), p. 119.
52. Kupka, *La Création*, p. 114.
53. Cited in Spate, "'L'Homme est la nature prenant conscience d'elle-même'", p. 21.
54. This connection between sexual reproduction and the movement of planets is repeated in *The Coloured One* (c.1919–20), where one can, with some effort, recognise a nude female figure exposing the inside of her thighs to the sunlight.
55. Georges Matisse, 'La Théorie moléculaire et la science contemporaine', *Mercur de France*, 1 June 1913: 520–5.
56. Kupka, *La Création*, pp. 159–60.

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