BIODYNAMICS: A CASE STUDY FOR THE BALANCE BETWEEN AUTHORITY AND ACCESSIBILITY IN SCIENCE DOCUMENTARY FILMS

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TABLE OF CONTENTS

BIODYNAMICS: A CASE STUDY FOR THE BALANCE BETWEEN AUTHORITY AND ACCESSIBILITY IN SCIENCE DOCUMENTARY FILMS

Introduction

Biodynamics[1] is an alternative agricultural theory first proposed by the early twentieth century philosopher Rudolf Steiner in 1924. In the decades since, biodynamics has spread all over the world as an effective method of sustainable agriculture. However the general public remains largely unaware of biodynamics, in part because it does not easily conform to the expectations of a scientific theory and so is often dismissed as being unreliable. In this paper, I will use biodynamics as a case study to examine what role science authority plays in determining the structure of science films, which affects which theories are publicized while others are ignored in the media. In particular, I will focus on the methods used by expository documentaries to portray science.

By mimicking the methods of science, the expository mode of documentary filmmaking allows science filmmakers to build convincing, seemingly objective films. The expository mode bestows authority on the filmmaker so that audiences readily believe the film's message, just like the public instantly accepts the word of a scientist as being factual. The methods of expository science films, which have a structure just as standardized as the scientific method, includes the use of literal "authority figures" such as scientists themselves, telling the viewer "the facts", as well as the use of formal

[1] The term "biodynamic" has been trademarked by Demeter USA (http://demeter-usa.org/), a non-profit organization that certifies crops as "biodynamic" according to an established biodynamic standard, not to be confused with other "green" or "organic" generalizations. However, for this paper, the term "biodynamic" refers to the farming techniques associated with the practice, not to Demeter certification.

language, voice-over narration, and the utilization of symbols such as lab coats and equipment. Audiences can easily recognize and understand the established format of science documentaries, which makes them useful and effective at conveying information. However, science documentaries that depend heavily on the expository mode tend to have messages restricted to persuading viewers of the believability of a topic, rather than designed to inform or reveal a subject. Basically, the goal of an expository documentary is to convince the viewer that a particular film's message is "true" or "right" usually in preference to an opposing or alternative theory. For theories like biodynamics, which do not conform to the expectations of science, expository documentary methods may not be the best form of representation. Instead, I will discuss the possibilities of developing a form of science documentary that aims to make science theories like biodynamics equally accessible, rather than depending on the authority of the expository mode to "prove" the value of one theory over another.

Understanding Biodynamics and its Relationship to Science

It is necessary to understand the atypical history of how biodynamics developed to see why it is considered alternative to traditional science. Rudolf Steiner, the founder of biodynamics, was a well-established philosopher and teacher of the early 20th century who had gained a name for himself with his lectures all over Europe on practically every subject, including alternative education systems, spirituality, nature, dance, and language. After the first World War, Steiner gave a series of eight lectures, later collected into one volume simply entitled "Agriculture Course", that outlined a method of farming based on

a combination of what Steiner called “peasant wit” and Steiner’s own mix of eclectic mysticism. The lectures were in response to farmers realizing a decline in the quality and amount of their crops in post-war years, despite the advent of chemical fertilizers. Biodynamics, as proposed by Steiner, successfully restores the condition and health of soils destroyed by pesticides and other chemicals, and results in produce and vegetation of much better quality than is produced by standard commercialized agricultural methods. Almost ninety years later, many farmers still follow Steiner’s biodynamic theories with excellent results. However, because much of Steiner’s *Agricultural Course* reads as more esoteric than scientific, the public as well as the scientific community still remains largely ignorant of biodynamics. Popular opinion often portrays biodynamic theory as a semi-religious philosophy, sometimes even describing it as a cult, rather than as a unique type of agricultural science with its own rules and logic.

Rudolf Steiner was not a scientist, but he nonetheless attempted to use his own terms to explain certain results and processes he had observed related to agriculture and biology. Lacking the training or scientific language to encode his thoughts in the normal tradition, Steiner had to invent his own language. For example, Steiner explains that “underlying all living things is a carbon-like scaffolding or framework- more or less rigid or fluctuating as the case may be- and along the paths of this frame-work the Spiritual moves through the World” (45). To the modern reader, used to traditional scientific terminology, statements such as this one sound confusing and nonsensical. But consider this version of the statement: “[Carbon] is easily the most versatile atom on earth. Because of its four valence electrons, it can form a large number of covalent bonds. With

different combinations of single and double bonds, an almost limitless array of molecular shapes is possible." (Freeman, 30). While Steiner uses terminology such as "scaffolding" instead of "covalent bonds" or substitutes the "Spiritual" for "molecular shapes", he is laying out the same basic principles. Another example relates to Nitrogen, which is considered an essential nutrient for all plant growth (Freeman 650). Steiner describes the importance of nitrogen in his own terminology: "nitrogen guides the *life* into the *form* or configuration which is embodied in the carbon. Wherever nitrogen occurs, its task is to mediate between the life and the spiritual essence…" (47, italics in original). Steiner's writings seem more like philosophy than science, using terms such as "Spirit" usually associated with religion, the antithesis of science. Many readers find biodynamics to be unsupported, illogical, and nonobjective because it is not presented in the expected fashion, i.e. not presented in accepted and familiar scientific terminology. However, to the average reader unfamiliar with scientific terminology, scientific writings can be equally obtuse.

Steiner's theory of biodynamics was the result of what he called "Spiritual Science" (87), which Steiner developed through a combination of his own observations of the world, collected bits of "peasant wit" (63) and scientific knowledge of his time. Ultimately, he believed that in order to truly be successful as a farmer, every farmer had to build a personal experience of what grew on their land and what did not, discovering for themselves the weather, the changing climate, and the organisms and plants that interacted to create the environment. Steiner admired the peasant's personal connection to the land, commenting that "I [Steiner] have always considered what the peasants and

farmers thought about their things far wiser than what the scientists were thinking… this will make our science wise- will make it wise precisely through the so-called 'peasant stupidity'" (64). Steiner did not dismiss potentially useful information just because the source was old or derived from an oral tradition, instead of presented in a scientific paper. At the same time, Steiner's goal was not to reject or overthrow traditional scientific progress or methods of research. He advised those who listened to his lectures on Agriculture that "meanwhile, in all the different spheres of life, we must try to supplement genuine modern achievement with that which can flow from our own, living conception of the Universe." (87) Steiner wanted his Spiritual Science to contribute to people's understanding of the world, not retract from it.

In many ways, Steiner's biodynamic theory predates the development of ecology. Ecology was not formally recognized as a scientific discipline until the mid-twentieth century as a result of a growing awareness of environmental concerns (triggered in part by such books as *Silent Spring* (Kingsland 199)). For example, the now-familiar term "ecosystem" was not even coined by Arthur Tensley until 1935, and it did not come into general use until the 1950s (Kingsland 184-185). Steiner's one major criticism of the science of his time was the trend towards focusing on details rather than the big picture, which he blamed on the invention of the microscope (Steiner, 89). Steiner explains: "Nowadays, one generally considers a single plant by itself. Then from the single plant, one proceeds to consider a plant-species by itself; and other plant-species beside it. So it is all prettily pigeon-holed into species and genera, and all the rest that we are then supposed to know. Yet in Nature it is not so at all. In Nature- and indeed, throughout the

Universal being- all things are in mutual interaction; one is always working on the other" (Steiner, 125). Instead of isolating pieces of an organic system in order to classify them, Steiner emphasized the importance of examining how things interacted and affected each other. Taking it a step further, Steiner argued that a farm is also a part of the natural system, not a separate piece of land carved away from nature. Basically, the essential argument of Steiner's biodynamics is that by working *with* the natural ecosystem, it is possible to create healthy sustainable crops. According to Steiner "…your farm is in truth a kind of individuality, and you will gain the insight that you ought to keep your animals as much as possible *within* this mutual interplay- and your plants too…. This is a perfect and self-contained cycle, which ought to be maintained, complete in itself (141, italics in original). Steiner believed that in addition to growing crops, a sustainable farm needed some supplementary elements: livestock to provide manure to be turned into fertilizer and added to compost; "natural" or wild (Steiner 131) areas to encourage local and beneficial insect populations such as bees, in addition to birds and other wildlife; gardens with camomile[2], yarrow, nettle, and other herbs and plants to be used in natural preparations to prevent disease and enhance growth. Steiner argued that a healthy farm also needed to connect to the earth and even the universe in a wider sense as well. As summarized by Gary Lachman:

> "This means that the soil used on a farm or in a garden should be seen as a living, organic system, and not merely as an inert collection of minerals and chemicals like potassium, nitrogen, and other plant nutrients. And for the soil to produce the best results, it needs to be 'dynamized' through methods that can direct the flow of the etheric and cosmic forces related to the seasons, the phases of the moon, the stars, and the planets" (217).

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[2] Camomile is Steiner's spelling of Chamomile (Steiner 94).

Rather than taking a dictatorial approach to agriculture, where the land is stripped of all plants and organisms save for the desired monoculture, Steiner advocated a farm that functions as it's own self-sustainable ecosystem where all the materials used in a farm returned to the farm, and the farm replenishes its own resources.

All this goes in contrary to the prevailing beliefs of Steiner's time, which advocated subjugating the land through the use of mechanization and chemical additives, and had yet to recognize ecology as a unique scientific discipline. Instead, Steiner promoted a return to a personal, sustainable level of farming. Yet even if readers were willing to follow Steiner's logic to a certain point, allusions to "cosmic influences" makes it hard to see biodynamics as a legitimate science. The conventions of science establish a clear way for the public to determine believability, which translates into scientific authority. Biodynamics does not follow traditional science methods and therefore struggled for recognition. Nonetheless, since the 1924 lectures, biodynamics has continued to evolve as various farmers around the world tried, adapted, and improved Steiner's basic methods, developing a method of agriculture that is remarkable effective as well as sustainable. Ironically, for a theory that is often rejected as un-scientific it may actually be very much so, having almost 90 years of practical experimentation to back it up. Biodynamics is also based in part on so-called peasant logic, gathered by generations upon generations of farmers slowly learning how to understand their environment throughout human history. Most of the proponents of biodynamics are farmers themselves, and when they speak of biodynamics, they speak about the real-life results they see in their fields. As one early biodynamics farmer summarizes: "this new

biodynamic farming method is no ‘recipe book’ but something which can be used only on the basis of practical experience” (Keyserlingk 64). While Steiner’s language may make biodynamics hard to understand or accept, the qualitative proof is evident in every biodynamic farm.

For decades farmers have been providing the living evidence of biodynamics’ success as an agricultural practice, but the theory is still relegated to the fringe of the scientific realm. However, recent scientific papers providing quantitative rather than qualitative proof have resulted in a growing awareness of biodynamics. Much of Steiner’s agricultural theories are explained using concepts such as “Spirit”, “ether”, cosmic forces, etc., which are not easily quantifiable by science. However, when it comes to the practical application of biodynamics, it basically involves a series of natural preparations used to treat the fields, along with the addition of organic compost and fertilizer. Studies carried out comparing biodynamic farms versus conventional farms have shown that biodynamic farms have “significantly higher” soil quality, greater organic matter content, and increased microbial activity (Reganold, *et al*., 1993; Bourguignon & Gabucci, 2000; Fliessback, *et al*., 2007; Hartmann, *et al*., 2006; Reeve, *et al*., 2010). Zaller and Kopke found that biodynamic preparations increase the amount of earthworms found in the soil (2004), while Reeve, *et al*., found that the resultant winegrapes in biodynamic-treated vineyards were of increased quality, and the vines showed increased canopy growth (2005). In relation to compost, one study found that biodynamic-treated compost was on average 3.4 degrees Celsius higher in temperature than untreated compost, which indicated an increased amount of thermophilic microbial

activity and resulted in a faster developing compost with a 65% greater amount of nitrate than control piles (Carpenter-Boggs, Reganold, & Kennedy, 2000). The study summarized: “Biodynamic preparations thus effected discernible changes in compost chemical and microbial parameters” (Carpenter-Boggs, Reganold, & Kennedy, 2000). All these studies indicate that farms treated by biodynamics have a scientifically “provable” difference from those untreated, and that all those differences seem to be positive.

However, none of these studies explain *why* biodynamic treatments work, just that they appear to do so, something that farmers have been attesting to for decades. Yet it is only now, with “scientific proof” that biodynamics is becoming more widely acknowledged. As some writers have noted “a scientific underpinning to biodynamics would aid its wider acceptance by people currently deterred by its rather esoteric, cultish image” (Wineanorak). However, biodynamics does not easily fit into the expectations of science: it’s originator is not a scientist, but a spiritual philosopher; it replaces scientific terminology with vocabulary more suited to religion; it did not evolved in the carefully controlled and monitored conditions of a lab, but grown in the field, quite literally. The theory of biodynamics is as intricate as the agricultural ecosystems it describes, hardly a theory that can be broken down into the binary of “true” or “false”.

One solution is to broaden the range of what is considered “accepted” science. Up to this point, biodynamics has been viewed through the lens of science people most readily think of: the black-and-white, objective, experimentally based, “hard” science of chemistry and physics. However, biodynamics is an agricultural theory with connections to ecology and biology, which are often dismissed as “soft sciences”. The distinction

between hard and soft sciences evolved as a side effect of science authority. “Hard” sciences are automatically considered to be more valuable, i.e. have more authority, than “soft” sciences because the collection of data is supposedly more accurate and reliable (Pigliucci 6-7). However, Massimo Pigliucci proposes an alternative way to view different science disciplines that helps place biodynamics in a continuum of science methodology. Pigliucci synthesizes the work of science studies scholars such as John R. Platt, Larry Hedges, George Howard, and Carol Cleland to conclude that rather than assigning some sciences more respect by calling them “hard” while dismissing others as “soft”, various science disciplines have different but equally valuable methods because they are trying to solve different problems about the world. For example, supposedly soft sciences like evolutionary biology, ecology, geology and astronomy depend more on observation, sometimes taking into account millions of years, to draw conclusions about how the world developed and evolved. Hard sciences like physics and chemistry, however, try to test through experimentation how the world will behave in the future. To summarize: “…we have a continuum from completely historical (paleontology, astronomy) to partially historical (evolutionary biology, geology) to essentially ahistorical sciences (physics, chemistry)” (Pigliucci 23). The more historical the science the more it depends on observation, while on the other hand ahistorical sciences depend on experiments, which have a higher degree of control and therefore greater accuracy than observation-based disciplines. Pigliucci also outlined a second continuum where on one end are “sciences that deal with simple, highly tractable systems…(physics, chemistry) to sciences dealing with extremely complex objects, where statistical

treatment is necessary and where the ability to explain and predict phenomena is much reduced (evolutionary biology, psychology)" (23). If biodynamics were to be characterized as a science it would be a complex, historically based science, dependent on observation rather than experimentation to explain its phenomena.

Science Authority vs Science Accessibility in Documentary Film

If biodynamics does not fit into the continuum of science along with physics and chemistry then the media used to portray it should be likewise adjusted. However, science documentaries tend to be viewed with the same preferential discrimination that characterizes the divide between "hard" and "soft" sciences. Science documentaries developed from the traditions of expository documentaries, and their structure is just as formal as any "hard" science. The expository mode has one of the longest histories in film, and "has continued to be the primary means of relaying information and persuasively making a case since at least the 1920s" (Nichols 34). Expository documentaries are primarily known for their use of authoritative "Voice-of-God" narration and their tendency to use images as tools to just illustrate and reinforce that narration, rather than to provide independent visual information. The over-dependence on narration lends expository documentaries towards "an economy of analysis, allowing points to be made succinctly and emphatically, partly by eliminating reference to the process by which knowledge is produced, organized, and regulated" (Nichols 35). Eliminating the knowledge-producing process to make films more convincing is remarkably similar to how scientific knowledge is developed and integrated into society,

the process that Latour and Woolgar termed fact construction (76). In the book *Laboratory Life: The Construction of Scientific Facts*, Latour and Woolgar describe the process a scientific theory undergoes to become accepted "fact" until eventually "readers are so persuaded of the existence of facts that no explicit reference is made to them" and "items of knowledge are simply taken for granted" (76). Using similar language, Nichols summarizes: "the great value of the expository mode [is that] a topical issue can be addressed within a frame of reference that need not be questioned or established but simply taken for granted" (Nichols 35). Essentially, by using compelling narration and overly simplified logic, expository documentaries become extremely effective propaganda tools because they literally "construct" truth. Like the greater authority bestowed on "hard" sciences, audiences also perceive expository documentaries to be more influential than other forms. The expository mode then easily transitions to science documentaries, especially since the point of most science documentaries is to convince the viewer of the "truth" of a theory.

The expository mode can be so persuasive in convincing viewers of "truth" that the actual veracity of the subject matter does not really matter. Audiences are so ingrained from years of watching science documentaries both on TV and film that the expository mode is akin to a subliminal language. Viewers recognize the elements of the expository mode- voice-over narration, expert interviews, illustrative graphics, etc.- and immediately know that the film they are watching is designed to convey information to them. It is not a fiction film, which also have film cues that tell viewers that what they are watching is not real, distinct from documentaries. The expository mode constructs a film

language that tells viewers that documentaries convey reality, are factual, and can be taken at face-value, even if the information being conveyed is not really true. An extreme example of how the expository mode can be misleading is the documentary “In Search of the Edge”, which uses the expository structure to build a compelling argument that the earth is flat, a theory that we know to be false. However, even though it is an accepted fact that the earth is a sphere, the film convincingly uses the methods of the expository mode to build authority to make a flat earth seem believable. “In Search of the Edge” illustrates just how ingrained the perceived believability of expository documentaries has become in viewers by misusing the expository mode to support an un-truth.

In order to make a false idea seem factual, “In Search of the Edge” uses an overarching narrator/host to guide the viewer through the film to a single conclusion (the earth is flat) while minimizing any excess information that was part of the “knowledge-producing process” as described by Nichols earlier (35). By streamlining the information into a simple conclusion, the idea described by the film seems like accepted “fact”. Expert testimony from interviews with authority figures, in this case labeled in the lower thirds as “university professor”, “scientist” and “retired teacher”, reinforce the “fact” proposed by the voice-over narration, and the film’s images, graphics and animations further illustrate the “fact” by demonstrating the message visually. The film then uses the combination of voice-over narration, expert reinforcement, and illustrative visuals to methodically counter every example explaining why the earth is a sphere to make the conclusion that the earth is flat seem very believable. For example, one argument used to support that the earth is a sphere is that as a sailing ship sails away, the hull disappears

from sight before the sails because the ship is dropping down around the curve of the earth in relation to the viewer. The film refutes this theory by arguing that the beams of light travelling from the ship that allow people to see it are affected by gravity and bend towards the earth. The light rays being emitted higher in the atmosphere by the tall sails of the ship take longer to hit the ground then the low light rays travelling from the hull of the ship, so the viewer can see the sails longer than the hull as the ship sails away. “In Search of the Edge” uses an expert authority figure, in this case the “scientist”, to explain the theory, while a graphic animation illustrates the scientist’s description by showing a ship with dashed lines representing light rays bending according to the effect of gravity. The film’s narrator then restates the argument in clear, simplified language for a conclusive result (which is actually untrue). The expository mode uses multiple reinforcement of the film’s message to effectively convince viewers that a certain idea is fact. However, the “fact” of an expository film is often just the filmmaker’s opinion, no matter how persuasive the film may seem.

The successful TV show “Myth Busters” provides another example of how expository structure can be used to prove, or in this case disprove, the veracity of a theory. In episode 61 “Deadly Straw, Primary Perception”, the Myth Busters team tests Cleve Backster’s 1960s theory of Primary Perception, which suggests that plants can use ESP, or extra sensory perception, to sense and react to the emotions of other animals and people. The existence of ESP is yet to be determined, so Primary Perception is widely treated as pseudo-science. However, regardless as to whether or not plants really have ESP, the term holds a similar connotation to some of the terms Steiner used such as

"ether" and "cosmic influence" that also results in biodynamics being dismissed as fringe science. Backster's original experiment tested whether or not a polygraph showed a reaction when the plants connected to the machine were exposed to stimuli. Backster used the experiment to show off the polygraph, which he invented, and the majority of his tests occurred in his office. In the Myth Busters re-creation, the show hosts build an insulated testing room designed to eliminate or at least minimize any conflicting signals such as sound, light, and even electromagnetic forces. They then connect a plant to a similar polygraph as the one used in the original experiment and attempt to threaten or injure the plant to see if the polygraph spikes in reaction. Eventually, using a fair approximation of the scientific method, the show hosts determine the theory is a bust.

Myth Busters, like many other science films, literally adopts the conventions of science because it helps reinforce the authority of the message. However, as discussed earlier, it represents a fairly narrow definition of science, one based on experimentation. In this particular episode, the hosts design the experiment to eliminate as many outside or conflicting factors as possible and repeat the experiment multiple times in order to minimize variability and reach a conclusive result. In addition, the show uses the multiple reinforcements of the expository mode to clearly build a believable conclusion: it uses easy to see and understand graphics, and most importantly, utilizes an overarching narrator to explain the process and provide a voice of authority. The use of the polygraph is especially effective. The polygraph machine shows a clear and immediate result that the viewer can instantly understand. The pen either draws a spike or it does not. Unlike some scientific tools or machines that output data or lists of numbers that then have to be

interpreted by a trained professional (i.e. a scientist) the polygraph can be understood by anyone. Clear visual proof reinforces the statements made by the narrator, further establishing the authority of the message. As evident by decades of expository documentaries, there is nothing wrong with using this method. However, it also limits and simplifies the conclusions that can be drawn from the results. Plants may not respond to threats being yelled at them in a lab, but perhaps they do react to as-yet-undefined "cosmic influences" that plants are surrounded with when they are outside, in a complex, evolving ecosystem like that described by biodynamics.

So where does this leave biodynamics? Should a film on biodynamics simply adopt the structure of the expository mode in order to convince viewers that biodynamics is "real" or "true", even though biodynamics itself does not conform to the traditions of a typical scientific theory? Unlike Myth Busters, where experiments can be used to prove a theory one way or another, biodynamics depends more on observation over time to garner support for its effectiveness. The expository mode can be adapted to fit observational-based sciences, but then films become even more dependent on narration to provide structure since there is a lack of visual support to reinforce the message. It is easy to film an experiment in a lab, but not quite as easy to film crops growing over time, through changing seasons, over years (well, it would be easy enough to film crops growing, but then no one would watch the film). An alternative method for representing tricky subjects like biodynamics may be switching the emphasis from science authority, or using film to prove facts, to science accessibility, or using film to make science understandable. The troubling issue with a theory like biodynamics after all is that it is difficult to understand,

in part because of its non-scientific and esoteric language. A film based on science accessibility does not necessarily need to abandon the lessons of the expository mode, but adapt them to fit the new goal of science understanding. For instance, rather than using scientists as authority figures to just tell us the facts, develop those scientists as individuals that the viewer can relate to and engage with on a personal level. These characters then allow the viewer a way into a world that they cannot visually understand directly, like with biodynamics, without having to resort to excessive narration.

For example, a documentary called “One Man, One Cow, One Planet” attempts to use Peter Proctor, a well-known biodynamics farmer in New Zealand (even called the “the New Zealand Father of Modern Biodynamic Agriculture”) and his work to promote biodynamics in countries like India, as a way to positively introduce viewers to biodynamics. A section early in the film observes Proctor digging in the soil in his biodynamic garden and proudly showing off the earthworms he uncovers. “Each one has a name” Proctor jokingly comments to the camera. It is welcoming footage, as we are part of his every day life, and it is easy to relate and sympathize with Proctor as a character. However, the film structure clings to the methods of the expository mode and removes some of the personal connection the viewer might have achieved by overlying much of the images with unnecessary narration. It is easy to see that Proctor loves his garden and loves earthworms but instead of letting the viewer draw their own conclusions, a narrator intrudes with “he has a fascination for worms”. Later, in a scene with Proctor in his home, humming while he is cooking, a personal connection is again denied by a narrator slapping a title of authority on Proctor by stating that he is “the

father of modern biodynamics", even though introductory text has already stated this in the beginning of the film. The rest of the film then almost looses touch with Proctor, shifting focus from his work to share and teach biodynamics in India, to a propagandistic essay on big agriculture versus sustainability. There is no doubt that the film is effective at conveying its message that sustainable, earth-friendly biodynamics is good, chemical-poisoning big agriculture bad, but it also becomes far less approachable. The expository mode simplifies the message to the point where it appears to be as straightforward as "fact", but it looses a lot of the depth that can make a film meaningful to the viewer. The film becomes a lecture, rather than an engaging experience meant to encourage the viewer to learn more. Also, as was evident with "In Search of the Edge", the "fact" of an expository film can also be very subjective, and "One Man, One Cow, One Planet" is no exception. This is not to say that the film's argument is untrue (as is clearly the case with "In Search of the Edge") but that it is important for viewers to realize that filmmakers have agendas and they use the expository method to support those agendas.

Farmers around the world increasingly utilize biodynamics as an alternative to traditional agricultural practices because it works regardless of the media or language used to describe it, which may be the only proof necessary. However, it has taken almost a century to reach this point, and while biodynamics is a growing name in the agricultural world, it has a long way to go before it becomes recognized in the public sphere. Film is a powerful media to spread ideas, but if theories like biodynamics are going to be acknowledged we have to treat them in a way that does not start with the assumption that they are "fringe" and therefore that their value has to be proved just because they do not

follow the formula of science. Rather than depending solely on the expository method to convey scientific authority in films, scientists and experts, such as farmers, can be used as ambassadors to create personal connections with viewers and promote scientific accessibility, which may allow theories like biodynamics to become better understood.

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