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Frederic B Jennings Jr.

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Frederic B. Jennings, Jr.



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Abstract: In earlier work, the author has studied the economic role of planning horizons in making a case for complementarity as the predominant feature of social interdependence. This paper compares the different choice strategies implied by substitution, opposition, and conflicts of interest in an economics of fear with those arising from horizon effects, economic complementarity, and concerts of interest in an economics based on love. The contrasting implications of a psychological literature on negative vs. positive emotions and their health effects, along with the findings in neurophysiological research about how humans are hard-wired for empathy and compassion leads to some fundamental changes in how we might address and revise social problems through economic analysis. The aim of this paper is to extend a horizontal case for complementarity in the author's previous work into its psychological links to research findings on healthy cognitive function and its emotional basis. An economics of substitution yields quite different conclusions about optimal institutional forms and how we address and frame social relations than are implied by an explicitly horizontal economics of complementary social relations. Recent psychological and neurophysiological studies support a horizontal case for complementarity in social relations, showing that our orthodox substitution assumptions and models of competitive equilibrium should be rejected for a renewed economic analysis based on horizontal models of complementarity and cooperation as a means to achieve greater social well-being in a healthier and more integrative form of social organization. The issues to be explored are not entertained within the currently existing frame of orthodox economics, so we must step beyond our standard habitual assumptions.

Keywords: fear, love, mirror neurons, compassion, psychology, complementarity, positive emotions.

Introduction

In previous work, the author has explored the importance of complementarity in economics with regard to its roots in increasing returns and its implications for institutional structure and social organization (Jennings 2009a, 2012a, 2016d,

2017ab, 2021, 2022, 2024). Traditionally, economists have elevated substitution and either/or relations of choice as the dominant form of economic connection, on which the alleged efficiency of competition is founded. Complementary interdependence, alternatively, yields a case for cooperation as our route to efficiency, in which competition reduces output just like collusion with substitution (Jennings 2005, 2006a, 2008a). Introducing a new form of interdependence through 'horizon effects' shows competition is also leading our society into a dangerously self-destructive myopic culture, repressing output of intangible goods such as information, love, and learning (Jennings 2008bc, 2009d, 2015a), and yielding costly ethical and ecological losses as well (Jennings 2006b, 2009b, 2010, 2012bc). This paper addresses the psychological health implications of an economy based on competitive fears vs. one based on cooperative affinity and love, by analyzing the social welfare implications of their resulting cultural patterns.

Economics is (and should be) about human well-being and how to organize social relations so that our collective well-being can be increased through a more efficient use of limited economic and ecological resources. But human well-being is properly seen and framed as psychological in character, raising questions on why so many economists seem to avoid this subject, treating competition as an ideal mechanism of social organization while ignoring its human emotional impacts on our health and happiness. The nature of interdependence, usefully framed in systems language as a balance of substitution (negative feedback) and complementarity (positive feedback), captures a cultural nexus of two conflicting emotional states of fear and love in human relations.

What is the most basic characteristic of human economic connection? Does it embody opposition, conflicts of interest, and either/or tradeoffs as substitution and scarcity assumptions imply? If so, then competition will operate to resolve these inherent conflicts, so ameliorating them. But what if our wants and needs are really aligned instead opposed, exhibiting a concert of interests, so showing complementary interrelations? In this case, it is cooperation – not competition – that is efficient in the allocation and distribution of economic resources.

Next, an introduction of planning horizons into the frame merely strengthens the case for complementarity and the efficiency of cooperation due to 'interhorizontal complementarity,' which means that a shift in anyone's

anticipatory or ‘horizontal’ range (to be termed a ‘horizon effect’) in the planning of choices prior to taking action affects the planning horizons of proximal others. In other words, private horizon effects spread contagiously across social space, showing up as social concerts of interest in learning, ethics, social resilience, organizational stability and ecological health. There is an even stronger case for cooperative forms of social organization when neurophysiological and psychological issues are raised; they also reinforce the horizontal arguments for more amenable social systems based on cooperation. This paper reports on some recent research in these fields and describes its significance for economics.

Two forms of interdependence

One of the least supportable axioms of traditional economics is its exclusive use of substitution to characterize our social relations and institutional systems, which then invites the use of independence assumptions to justify partial analyses in economics, ‘as if’ the phenomena under our study were separate from all other options asserted as ‘irrelevant.’ In recent years, a more robust economics of networks has emerged, based on the unbounded interconnectedness of economic concerns and calling for models of ‘bounded rationality’ in Herbert Simon’s (1982-97) sense of that term as setting a boundary between rational limits and unbounded effects. Unfortunately, most studies in economics do not take place in such fully holistic contexts. Another more radical view is that of ecological economics, where all choices are seen as entwined and embedded in ecological settings, so are subject to vital limits on natural resources and their use. As Georgescu-Roegen (1970, pp. 2-3) explained, ‘actuality is a seamless whole’ which ‘has no joints to guide a carver.’ The nature of social interdependence as an intertwined combination of substitution and complementarity is a matter that must be addressed directly and not ignored.

The question is how, in the most general case, our wants and needs are related: is the interpersonal correlation of human desires most generally positive or negative? Or is it both, in some sort of ineluctable balance? Traditionally, economists have assumed that substitutional tradeoffs dominate throughout the realms of economic production and demand – as well as in social relations – although a very strong case can be made for synergetic complementarities in

every one of these settings (cf. Nelson 1981, pp. 1053-55; Jennings 2008a, 2015ab, 2016a).

A network concept combines substitution and complementarity in some sort of complexly interdependent and nondecomposable balance; systems theory uses the notion of negative and positive feedbacks to represent a similar phenomenon of interconnectivity (cf., e.g., Senge 1990, pp. 79-80; Meadows 2008, *passim*). In transportation networks, the twin notions of parallel links and end-to-end ties are equivalent to these concepts of substitution and complementarity (Jennings 2006a); here the distinction is fully contextual and purpose-specific, since any one traveller's rivalrous tradeoffs can be another's sequential routes. The point is that our relations of interdependence seem to coexist in a complex and nondecomposable mix: we either drink beer or wine when we're thirsty, often with pretzels or cheese, but throwing a party includes them all against some other diversional options (such as seeing a film or going bowling). In a complex and dynamic economy – especially if framed much like an ecology – substitution and complementarity are interwoven and not distinct; we need to address them as a balance of interactive phenomena, which calls for more open and challenging styles of economic analysis.

But the intermixture of substitution and complementarity raises some difficult institutional questions: if substitution calls for competition as efficient, and complementarity wants cooperation, how do we organize society in favour of maximum benefits and more resource efficiency? Can we weigh our relations of interdependence in different contexts and design our institutions accordingly? If competition encourages substitutes while effectively stifling complements, while cooperation does the reverse, can we find 'seams' in this 'seamless whole' across which one or the other applies and structure systems accordingly? Or are these seams too context- and purpose-specific for such an approach to work? Unless we can declare one form of relation or the other as a more general case – if so, this author would opt for complementarity (Jennings 2008a, 2015a, 2016a) – we must adopt a different tack to resolve this question. This is where planning horizons and horizon effects come in, with another angle of vantage on the nature of interdependence.

If we assume some sort of ineffable balance between substitution and complementarity in all economic contexts (as our decisional impacts spill

outward forever on everything), then the question to pose is how ‘horizon effects’ shift that balance, which turns out to have a very general analytical answer. Given interhorizontal complementarity – namely, that private ‘horizon effects’ are socially contagious, so shifting others’ horizons usually in the same direction through role model, learning and other effects – the balance of substitution and complementarity, in response to any horizontal lengthening, gravitates away from substitution in favour of complementarity in economic relations. In other words, as planning horizons extend, economic incentives align more closely with each other, causing social conflicts to shrink as people start to take more into account each other’s needs in their individual choices. Another way to say this is: longer social horizons bring better internalization of the externalities spilling from private decisions, as they equate to an ethical increase of conscience by incorporating more of the radiant spreading effects of our privately motivated actions (Jennings 2009c, 2010). One can also consider it thus: in the course of economic development, the composition of human wants tends to shift away from material goods in favour of intangible outputs such as information, art, knowledge and community, yielding another reason for a transition from substitutional to complementary interdependence as we grow and mature, personally, culturally, and developmentally. So do horizon effects structure the character of our social relations in all economic contexts.

This story yields a bottom line: competition is spawning a myopic culture by its stifling of intangible outputs such as learning, culture, love and information exchanges, while encouraging catastrophic ethical and ecological losses. The lesson of economic development is that social institutions need to adapt to this horizontally-driven shift of social and economic relations toward complementarity by evolving away from competitive toward more cooperative frames (Jennings 2009e). All these arguments set the context for what follows below. What will now be addressed are the cultural and psychological impacts of these two forms of social interdependence. Substitution assumes opposition of interpersonal interests, so all of us should compete with each other as a means to their resolution, placing goods into the hands of those who want them most (where ‘want’ is gauged by an agent’s willingness or ability to pay, ignoring income effects and distributional anomalies). Complementarity, on the other hand, takes our wants as aligned, where our fortunes adjust together like a tide raising and dropping all boats. The human, social, cultural and welfare implications of these

two orientations could hardly be further apart. Substitution is not our only form of interdependence; once we introduce and include complementarity as an alternative form of social relation, another look at our institutional choices should be addressed.

Two economic cultures

A rather simplistic classification of the two economic cultures stemming from substitution (or opposition) and complementarity (as stressing mutual or common needs) is based – as shown in this paper’s title – on the notions of ‘fear’ vs. ‘love,’ for reasons to be elaborated a bit further below. Another standard of comparison, of particular interest to social economists, is on the relative individualism or collectivism of economic cultures. In an essay on human ‘flourishing’, Peterson and Chang (2003, p. 69) compare Western and Eastern societies with respect to their interpersonal linkages, explaining that Western cultures start with an individualistic claim of independent agents, while Eastern cultures tend to emphasize relationships with others in terms of a community interdependence. This is a profound difference in emphasis that colours social relations.

So one comparative frame for the difference between these two economic cultures based on substitution *vs.* complementarity would be on their individualism and therewith inclusion of others in decisions or reflections thereon. The self-orientation of agents in the United States is thus contrasted with the attempt in more Eastern cultures to achieve ‘harmonious interdependence’ with their social community. Yet there is a problem here, if systems adapted to human selfishness serve to reinforce self-oriented behaviour in their effects. Senge (1990, p. 274) quoted Badaracco and Ellsworth (1989) on the ‘self-fulfilling’ character of the belief ‘that people are motivated by self-interest and by ... power and wealth,’ which these authors contrasted with the notion that ‘people truly want to be part of something larger than themselves’ to which our organizational systems can successfully appeal within a larger aspirational or horizontal frame of reference.

Furthermore, if rampant selfishness is symptomatic of short horizons in a myopic culture, as suggested above, then any acceptance of this sort of behavior as 'natural' is part of the problem. Some management theorists suggest this is so. Chris Argyris (1971, pp. 262-63, 268-69; also cf. Maslow 1954, 1968; Wachtel 1989; Kohn 1986; Scitovsky 1976; McGregor 1971), an organizational expert, declared that when conventional (authoritarian) management treats its members like children and not as adults, mature people in these settings show symptoms of ill health, including 'frustration, failure, short time perspective and conflict.' He voiced concern about organizational fragmentation thus: 'The nature of the formal principles of organization causes the subordinates, at any given level, to experience competition, rivalry, intersubordinate hostility and to develop a focus toward the parts rather than the whole.' Douglas McGregor (1971, pp. 310-11) warned of the 'behavioural consequences' of a Maslovian (cf. Maslow 1954, 1968) 'deprivation of needs' in a well-known management paper, which include 'passivity, ... hostility, ...[and] refusal to accept responsibility' which do not derive from 'human nature' but are 'symptoms of illness – of deprivation of ... social and egoistic needs.' He went on to tie the problem of higher-order need deprivation to behavioural patterns of materialism and heightened demands for money: 'Although money has only limited value in satisfying many higher-level needs, it can become the focus of interest if it is the only means available.'

The point of all this is to intimate that some manifestations of selfishness, myopia and materialism in our social culture might be pathological symptoms of our own improper institutional designs, so of a competitive failure in the presence of complementarity. This suggests, in turn, the role and importance of horizon effects in economics. Without an economic theory that incorporates planning horizons and horizon effects, the emergence and maintenance of dangerously myopic cultures stay unseen. The gulf dividing the two economic cultures seen in this paper is also horizontal in its origins, as implied in quotes above and further developed in what is to follow. Within this view, a focus on competition and cooperation in their cultural manifestations should help to frame these connections more clearly, after a few introductory comments about the use of 'fear' and 'love' as a way to distinguish these two cultural environments in terms of their differing psychological impacts.

A qualifying disclaimer is also needed here, however. First, it is not always the case that fear rules in competition, any more than love will always be the hallmark of cooperation. Every case is different, and people deal with their environments and cultures in diverse ways. So one must understand that this rather simplistic categorization of 'fear' and 'love' as the basis for comparing these two cultures is just that: it serves as an easy way to analyse their basic difference. However, within that disclaimer, the social implication of substitution and competition is that other rivals are generally seen in terms of a conflict of interest, through a lens of opposition. In this sense, competition entails a contest between individuals, such that everyone needs to guard their position against the incursion of enemies. Kohn (1986, pp. 55, 61-65, 108, 110, 113, 123, 129-31 and 143) described the psychological impact of competition on human performance as leading to these sundry effects on behaviour: reduced performance; stress; avoidance of failure rather than a quest for success; low self-esteem arising from a seemingly-addictive need for approval that is always conditional; and 'rank conformity' and risk aversion, turning us 'into cautious, obedient people. ... The chief result of competition ... is strife.'

So, this is one view of how an individualistic culture of fear, stress and strife affects us as individuals. We look to our rivals as opponents, each against the other. We believe it is in our collective interests to compete with each other, in accord with what so many economists have forcefully claimed now for well over two centuries. Yet there remain doubts, some of which Kohn expresses so well. Indeed, as Argyris pointed out above, the psychological impact of treating adults like children in an authoritarian setting includes 'short time perspective and conflict.' This sort of short-sighted behaviour is symptomatic of social horizon effects within a myopic culture, to which we have grown very habituated; as McGregor (1971, p. 317) said so aptly and well: 'Fish discover water last.' Now let us look at complementarity and the economics of love.

When one assumes that others' interests are in line with one's own, the social scene changes in radical ways. First, if I believe your well-being contributes to my own, then I will make as much effort to help you as I do for myself; indeed, the whole premise erases any clear distinction between my own incumbent needs and yours! This is what Richard Nelson (1981, pp. 1053-55) said, translated to human relations: 'If factors are complements, growth is superadditive... The growth of one input augments the marginal contribution of others.' In this setting,

individualism does not apply: 'there are not neatly separable sources of growth, but rather a package of elements all of which need to be there.' In other words, cooperation activates complementarities and allows human flourishing, without dividing us up in opposition over our needs. All of us rise and fall together; the more effectively we can work as a team, the better off we all are. This suggests a more benign and kinder economic world than our dismal economics of selfishness. An economy based on love and complementarity embraces community at its core.

However, the limit to such bountiful collaboration is precisely the sort of aggressive behavior rewarded by competition! Selfish predation and opportunism make cooperation impossible; everyone needs to be on the team, to work in full concert together, or this form of social organization will fail to perform at its true potential. Alas, success is rare in this setting; we are all so enamoured by individualistic conflict that the fruits of cooperation tend to stay out of reach. This is the real limitation of a competitive culture and what it teaches; selfishness, far from being a virtue (e.g., cf. Rand 1964), precludes successful organization of complementary efforts. We never see what we miss.

So, what we have are two economic cultures, simplistically characterized as based on 'fear' vs. 'love.' One is rife with opposition and conflicts of interest as its guiding light; it leads to a culture of fear reflected in stress and strife across society. The other is open through common needs to realize an underlying concert of interests, at least if team members set aside their personal inclinations sufficiently to work for the welfare of all, to let down their resistance and see each other with care and compassion. Indeed, we are all prisoners of this dilemma; arguably, it is the source of much of our social malaise (Jennings 1983). The new research in neuropsychology also attests to such things; these are issues economists should be aware of. They are a very large part of the reason for writing this paper.

Human well-being and functionality

Economics is about decision-making. But the making of decisions – rational in some degree or not – is about the successful projection of actual outcomes through some sort of causal grasp by a selective and uncertain mind. The process involves speculation and truth: 'If I kick the world in this way instead of in that way, this will be the result and not that.' But what are the goals and intent of our actions? In the most general sense, they are meant to reduce negative and to

promote and achieve positive feelings in and about oneself (hopefully, inclusive of others but not necessarily so). We act and choose for ‘well-being’ but do not always achieve it. There are many slips between cup and lip.

For one thing, we live in a social world where reactions by others must be a critical part of our understanding of what we do and its results. As Norris and Cacioppo (2007, p. 87) pointed out, ‘human beings are fundamentally social creatures’ whose emotions have ‘evolved to promote cooperation and communication... From birth, we engage in behaviours intended to ensure affiliation with other members of the species, especially caregivers.’

So, whenever we make a choice, we perceive its situational context, apply a causal model thereto as a part of understanding its structure and operation, project the potential outcomes of diverse courses of action, and then evaluate those options and make a decision based a full range of outcomes’ likelihood and value to us. These value-assessments have emotional components – perhaps their central feature – seen as positive (for affinity) or negative (for retreat) that informs our best course of action. Most of these subjective calculations are unconscious, built into our implicit habits of thought upon many unquestioned assumptions.

a. The roots of human empathic connection

But how do we know what others will do in response to our decisions, and how do we know what they might think or react autonomously on their own? All will affect the results of our choices, so we must develop prior expectations of others’ vantages and their general intentions. This calls for us to develop and nurture an empathic comprehension of others that is not automatic; empathy should be included in economists’ concept of choice, which is a normative process of multidimensional causal projection that includes others in its screening of outcomes. Indeed, as Norris and Cacioppo (2007, p. 93) observed, ‘it can be dangerous not to read correctly the motives and intentions of others. ... Accurate evaluation of the motives of others and decryption of their current emotional states are skills necessary for navigating our social world.’

Fortunately, recent findings in neuroscience shed light on how we develop empathic capacity; mirror neurons suggest ‘a common neurobiologic dynamic for our understanding of others’ in which ‘we mentally rehearse or imitate every

action we observe ... mirror neurons help us share others' experience as reflected in their expressions, providing a biological basis for empathy and for the well-known contagiousness of yawns, laughter, and good or bad moods' (Dobbs 2006, pp. 1-2). 'This model posits that perception of emotion activates in the observer the neural mechanisms that are responsible for the generation of similar emotion. Such a system prompts the observer to resonate with the emotional state of another individual...' (Decety 2007, p. 252). Gallese (2004, pp. 4-5) elaborated on this point: 'Successful perception requires the capacity of predicting upcoming sensory events. Similarly, successful action requires ... predicting the expected consequences of action.' These inherent and automatic processes involve simulation as a means of decoding others' 'emotions and sensations' within a "we-centric" ... interpersonal space.' This is how we establish a projective 'familiarity' with other individuals, in which 'the "objectual other" becomes "another self."

However, the process is neither direct, automatic nor simple. Mirror neurons, as one example, according to Iacoboni (2007, p. 447), 'do not simply provide an action-recognition mechanism but rather represent a neural system for coding the intentions of other people' that 'seems to reflect a more holistic stance toward contexts, actions and intentions.' Norris and Cacioppo (2007, p. 96) clarified the process by explaining that empathy also has a 'social context' involving the 'imitation of facial expressions' that goes beyond mirror neurons to include 'motives, intentions, and context' in an embrace of inferential reasoning about 'emotional experience.'

b. The relation of social connection to physiological and mental health

But these social connections are also related to physiological as well as mental health and well-being. Sue Carter (2007, pp. 425, 434) argued that a more comprehensive 'understanding of the processes and mechanisms responsible for health' is needed. She added that: 'health is not simply the absence of illness'; it is 'maintained in part by social interactions and social bonds. ... Of special relevance to human health is ... the presence of social bonds to reduce fear and overreactivity in the face of stress' and to reduce 'many forms of mental illness, including autism, depression, and schizophrenia.' Social bonds are important determinants of human health.

Taylor and Gonzaga (2007, pp. 466-67) find it ‘intriguing’ that ‘the affiliative system ... continues to have such powerful effects on health and survival into the present day ... through social support and social integration...’ They elaborated on what has been learned, that ‘social support reduces psychological distress’ in ‘a broad array of stressful conditions.’ For humans and other animals, ‘social isolation’ brings ‘a heightened risk of both chronic and acute health disorders,’ especially through ‘stress responses. ... People without social support systems, for example, are more vulnerable to infectious disorders.’ Such social ties are powerful health factors, suggesting that a system based on competitive fear endangers our health.

Norris and Cacioppo (2007, p. 88) also explored the crucial role of social linkages in human functionality and health, where social relationships have important beneficial effects in contrast to the health risks associated with individual loneliness. They explained that: ‘Healthy social relationships continue to be important for emotional and physical well-being throughout the lifespan’ because ‘social isolation is a major risk factor for morbidity and mortality’ and ‘is related to cardiovascular function and sleep quality.’ Isolation is associated with predominant negative feelings at the cost of ‘lower positive affect,’ so loneliness and a lack of empathic connection to others affects one’s emotional life and leads to worse ‘cardiovascular functioning and stress appraisals’ compared to people’s ‘socially embedded counterparts.’ Consequently, ‘daily social interactions have consequences not only for emotional experience but also for cardiovascular functioning and health.’

Cacioppo, Petty and Tassinary (1989, p. 83) added that: ‘...The leading causes of disability and death in Western civilizations have substantial social and behavioural components...’ Uchino et al. (2007, pp. 474-75) expanded upon the medical aspects of social connectedness by calling these ‘social processes ... among the more powerful psychological predictors of physical health outcomes’ in their impact on ‘physical health conditions.’ The role of social support ‘is critical to understanding ... health outcomes.’

After reviewing the harmful cardiovascular effects of social stress, along with the relation of physiological functionality to healthy social relationships, Uchino et al. (2007, p. 480) discuss how ‘one’s relationships’ affect ‘mortality. The links between social relationships and health are most evident for cardiovascular

mortality, with some studies showing links with lower cancer and HIV mortality.’

c. The harmful impacts of a stressful society on human health

Much research is specifically addressed to the health effects of stress; Kudielka et al. (2007, pp. 56-57) pointed to the importance of such concerns: ‘The World Health Organization (WHO) concluded that stress is one of the most significant health problems in the 21st century. ...Stress responses appear to be a close correlate or even a determining factor of the onset of different diseases or disease progression...’ Taylor and Gonzaga (2007, pp. 456-57) added that, in contrast to its harmful effects on long-term health, stress has short-term survival benefits in ‘fight or flight’ situations because such responses ‘mobilize the body to meet the demands of pressing situations’ and then ‘restore [it] to its previous functioning.’ However, ‘repeated or recurrent stress ... can have long-term costs’ for health, including ‘suppression of cellular immune function ... chronic increases in blood pressure ... abnormal heart rhythms ... immunosuppressive effects ... increased susceptibility to infectious disorders ... hypertension, cardiovascular disease, and insulin resistance, enhancing risk for diabetes, among other disorders.’ They also raise some questions about these health-related responses, since ‘fighting or fleeing may not be humans’ best defence against predators.’ They suggest another strategy called “tend” and “befriend” because sticking together in a group provides ‘more hands for defence’ and might also ‘confuse or intimidate a predator.’ Humans may have ‘evolved to use social relationships as a primary resource to deal with stressful circumstances.’

As these two authors put it, based on their own and others’ research, ‘there is an affiliative neurocircuitry that prompts affiliation, especially in response to stress, in many animal species, and especially in humans.’ In other words, ‘just as people have basic needs, ... they also need to maintain an adequate level of protective and rewarding social relationships.’ They speculate that ‘there is a biological signalling system that comes into play if one’s affiliations fall below an adequate level’ which needs to be ‘met through purposeful social behaviour, such as affiliation. If social contacts are hostile or unsupportive, then psychological and biological stress responses are heightened.’ Supportive and positive social contacts reduce stress. Taylor and Gonzaga (2007, p. 469) conclude that: ‘A picture of the emerging regulatory role of affiliation in response to stress ... is

coming into view.’ Once again, social connection is a critical aspect of human well-being.

d. *The health effects of emotion*

General Effects. Emotional states in general have important health effects. ‘Aristotle was among the first to suggest the connection between mood and health: “Soul and body, I suggest, react sympathetically upon each other,” he is credited with saying.’ Here Pert (1997, pp. 190-93) goes on to explain that: ‘Howard Hall ... in 1990 ... was the first to show that psychological factors, that is, conscious intervention, could directly affect cellular function in the immune system.’ Furthermore, ‘Lydia Temoshok, a psychologist then at UCSF, showed that cancer patients who kept emotions such as anger under the surface ... had slower recovery rates than those who were more expressive.’ Being in close touch with one’s own emotional needs made ‘immune systems ... stronger and tumours smaller’ for cancer and other patients. As Pert put it, ‘all [honest] emotions are healthy’ as they ‘unite the mind and body’ so to repress one’s emotions causes stress than ‘can lead to disease.’ Pert’s main point is that being in touch with one’s own feelings and expressing them openly is important for health.

Heart Rhythms. Some interesting insights have come from the HeartMath Institute [1] about the heart’s role in healthy physiological function. Indeed, McCraty, Bradley and Tomasino (2004/5, pp. 15-19) argued that ‘the heart is now recognized by scientists as a highly complex system with its own functional “brain”.’ Consequently, it is now believed that the heart is able ‘to learn, remember, and make functional decisions independent of the brain’s cerebral cortex.’ Furthermore, the heart’s continuous signals ‘influence ... perception, cognition, and emotional processing’ through ‘electromagnetic field interactions.’ These three authors believe that the heart ‘*provides a global synchronizing signal for the entire body.*’ The heart’s rhythms respond to our emotional states in this way: ‘Negative emotions, such as anger or frustration, are associated with an erratic, disordered, *incoherent* pattern in the heart’s rhythms. In contrast, positive emotions, such as love or appreciation, are associated with a smooth, ordered, *coherent* pattern in the heart’s rhythmic activity.’

Beyond those scientific findings, we find ‘that sustained positive emotions ... give rise to ... *psychophysiological coherence*’ in which ‘the heart’s electromagnetic field becomes correspondingly more organized.’ Physiologically, the body’s

systems become more efficient and harmonious, and psychologically they react with reduced stress, better emotional balance and ‘enhanced mental clarity, intuitive discernment, and cognitive performance.’ This research thus ties ‘psychophysiological coherence’ to enhanced ‘consciousness ... physiological function ... emotional stability, mental function ... intentional action ... [and] our awareness of and sensitivity to others around us.’ Furthermore, ‘positive emotions, such as love and appreciation’ generate a mutually reinforcing physiological and social coherence. When ‘individuals within a group increase psychophysiological coherence’ their ‘psychosocial attunement’ rises along with their social coherence, which can also contribute to individuals’ psychophysiological coherence. ‘An expanded, deepened awareness and consciousness results,’ which is ‘the basis of self-awareness, social sensitivity, creativity, intuition, spiritual insight, and understanding of ourselves’ and our connectedness.

Dana Tomasino (2007, pp. 530-31) offered an interesting summary of the research at HeartMath about the cognitive effects of positive emotions, which ‘appear to broaden the scope of perception, cognition, and behaviour and to enhance creative and intuitive capacities’ in a process that appears very similar to an extension of our horizontal range. ‘Conversely, negative emotions tend to restrict perception, produce more reactive, rigid, and stereotypic patterns of thought and action, and have been found to be associated with reduced task performance and impaired intuitive judgments’ in a manner resonant with a narrowing of our horizontal range of anticipatory projection in choice, akin to the emergence of a closed mind in denial. She offers, as a general finding, that ‘emotional stress and negative emotions such as anger, frustration, and anxiety lead to heart rhythm patterns that appear *incoherent* – irregular and erratic.’ This phenomenon is then contrasted with the inverse effects of ‘sustained positive emotions, such as appreciation, care, compassion, and love’ which ‘generate a smooth, sine-wave-like pattern in the heart’s rhythms.’ In this sense, our emotional states shape the very functionality of our bodies and minds, determining whether they work together smoothly or incoherently.

Fear and Love. The point is that stress interferes with physiological functionality at all imaginable levels. Arguelles, McCraty and Rees (2003, pp. 15-16, 20) elaborate on some of the harmful consequences of stress on our bodies and minds, since stress ‘causes our system to get “out of sync” – not only mentally and

emotionally, but also physiologically,' affecting our emotional states. Stress causes in us a range of dangerous symptoms, including 'emotional incoherence, increased energy drain, and added wear and tear on the body' because 'when the heart transmits a disordered signal to the brain and activity in the nervous system is chaotic or desynchronized, higher cognitive functions are inhibited...'. This desynchronization of physiological functionality places severe limits on 'our ability to think clearly, focus, remember, learn, and reason.'

The associated effects of positive feelings are quite the reverse, improving mental and bodily functions in a wide diversity of ways. As these three authors put it, 'sustained positive emotions, such as appreciation, love, and compassion, are associated with highly ordered or *coherent* patterns in the heart rhythms' that effectively synchronize our 'autonomic nervous system' in a manner that increases our 'physiological efficiency ... resulting in enhanced focus, memory recall, comprehension, and creativity.' These positive 'coherence-building tools are effective in helping to stabilize nervous system dynamics' in such a way to make us more effective and functional. These authors conclude on a positive note: 'A new consciousness about the heart may have profound implications not only for ... our learning systems but for the cultivation of those aspects of human experience that are associated with wholeness,' namely with the widespread social inculcation of feelings of 'caring, giving, appreciation, nurturing, and love.' The relevance of this work to economics seems pretty obvious, that the impact of competitive frames, by inculcating negative feelings of stress across human society, is having harmful effects on our physiological health, our reasoning, and thus on our functionality and general well-being. Cooperative systems are clearly more conducive to rational decision making and more extensive horizontal ranges of awareness and consideration for others, due to their support and reinforcement of positive feelings and a sustained sense of affinity with our fellow humans in society.

e. Positive feelings and human performance

According to Childre and McCraty (2001, p. 13), positive emotions have very beneficial physiological health effects; they 'improve health and increase longevity, increase cognitive flexibility and creativity, facilitate 'broad-minded coping' and innovative problem solving, and promote helpfulness, generosity, and effective cooperation.' Seligman and Csikszentmihalyi (2000, pp. 5-7),

leading advocates and adherents of a general approach that is called ‘positive psychology,’ characterize the field in this manner as focused on the proper valuation of ‘subjective experiences’ such as ‘well-being, contentment, and satisfaction (in the past); hope and optimism (for the future); and flow and happiness (in the present).’ Consequently, an emphasis on ‘positive individual traits’ will expand our individual human capabilities ‘for love and vocation, courage, interpersonal skill, aesthetic sensibility, perseverance, forgiveness, originality, future mindedness, spirituality, high talent, and wisdom’ in ways that enrich our lives and well-being. On a more social level, a culture reflecting and sharing positive feelings about ourselves and each other will likely expand ‘the civic virtues and the institutions that move individuals toward better citizenship: responsibility, nurturance, altruism, civility, moderation, tolerance, and work ethic.’ These two authors find these positive individual traits ‘act as buffers against mental illness,’ calling ‘in this new century’ for a ‘science of human strength’ that will likely have far-reaching beneficial effects on human society.

Duckworth, Steen and Seligman (2005, pp. 629, 635-36) extend these insights by identifying three domains of inquiry: ‘pleasure, engagement, and meaning,’ each of which enhances our general understanding, behaviour and sense of fulfilment. The first of these domains, ‘the pleasant life, concerns positive emotion about the past, present, and future,’ with all the positive health effects as described above. ‘The second domain is the engaged life,’ which expands the range of our ‘strengths of character and talents’ by accentuating our ‘positive individual traits,’ making us better and more considerate human beings. ‘The third domain of positive psychology is the meaningful life,’ reflecting what Badaracco and Ellsworth (1989, quoted in Senge 1990, p. 274) said about how people ‘truly want to be part of something larger than themselves’ by ‘belonging to and serving positive institutions.’

The question posed in this context by positive psychology, according to Duckworth, Steen, and Seligman (2005, pp. 635-36), concerns what types of institutions support, nurture and ‘enable the best in human nature’ most effectively by ‘mentoring, strong families and communities, democracy, and a free press.’ These represent some of the means to support positive feelings through ‘positive institutions.’ Because meaningful lives stem from a sense of ‘belonging to and serving something larger than oneself,’ they are best achieved through an effort to

design our institutions to encourage and support positive feelings among their members for each other. This is a critical difference between competitive and cooperative frames that is generally absent from most economic discourse.

Frederickson and Losada (2005, pp. 678-79) examine a similar set of issues in somewhat different terms, with respect to the patterns and requirements of 'flourishing' vs. 'languishing.' '*To flourish* means to live within an optimal range of human functioning, one that connotes goodness, generativity, growth, and resilience.' They find epidemiological research suggesting 'that fewer than 20% of U.S. adults flourish and that the costs of languishing are high' because 'languishing brings more emotional distress, psychosocial impairment, limitations in daily activities, and lost workdays.' They go on to explain that 'a key predictor of flourishing is the ratio [2] of positive to negative affect' in our social systems, in part because positive feelings have 'adaptive value' and other equally 'multiple, interrelated benefits.' First of all, 'good feelings alter people's mindsets' because 'induced positive affect widens the scope of attention, broadens behavioural repertoires, and increases intuition and creativity,' all desirable outcomes that should be sought in whatever forms of social organization that we might adopt.

But furthermore, their second point is that 'good feelings alter people's bodily systems' because 'induced positive affect speeds recovery from the cardiovascular aftereffects of negative affect, alters frontal brain asymmetry, and increases immune function,' so has radical impacts in favour of human health and functionality. Their third point, based on many research findings, is that 'good feelings predict salubrious mental and physical health outcomes' by promoting a wide array of beneficial human traits, including many important improvements such as: '(a) resilience to adversity, (b) increased happiness, (c) psychological growth, (d) lower levels of cortisol, (e) reduced inflammatory responses to stress, (f) reductions in subsequent-day physical pain, (g) resistance to rhinoviruses, and (h) reductions in stroke.' Their fourth positive finding that results from more beneficial and amenable social settings is that they contribute to greater longevity, based on 'several well-controlled longitudinal studies.'

f. Horizon effects and broadened perspectives

Although the whole set of authors reviewed and summarized above do not employ the concept of 'planning horizons' or 'horizon effects' in any of these

works, such as when describing their ‘broaden-and-build’ theories of positive emotion, the ways they address such phenomena are resonant with horizontal patterns, specifically with regard to expanded human perspective, flexibility, greater open-mindedness and stronger learning effects. Consequently, the lesson is very clear that planning horizons offer an organizing principle for this research, while ‘horizon effects’ suggest their persuasive relevance to economic behavior within the institutional frames identified and contrasted here. The issue is one about whether and how competitive systems encourage stress and fear by supporting oppositional rivalries, with these serious health effects while shrinking our horizontal ranges and human functionality, and how such institutions contrast with alternative forms of organization based on cooperation and a greater interpersonal sense of social affinity, such that the pervasiveness of love flowers into flourishing humans with meaningful lives who look out and care for each other in nurturing social relationships and cultural environments. This is the key issue addressed in this paper.

Frederickson and Losada (2005, p. 679) go on to develop some further and more horizontal implications of their theory of positive *vs.* negative emotions. While ‘negative emotions ... narrow people’s behavioural urges toward specific actions that were life-preserving for human ancestors (e.g., fight, flight),’ they are to be contrasted with ‘positive emotions [which] widen the array of thoughts and actions called forth (e.g., play, explore), facilitating generativity and behavioural flexibility.’ These claims are supported by well-designed ‘laboratory experiments ... showing ... induced negative emotions narrow people’s momentary thought-action repertoires, whereas induced positive emotions broaden these same repertoires.’ Such reactions are wholly horizontal in their subjective expansion or retraction of the range of human awareness and anticipatory choice, which is precisely what is meant by the notion of ‘horizon effects’ (as shifts in our horizontal ranges of anticipatory understanding). The horizontal elements are clearly evident in their articulate description of ‘the benefits of negative emotions – which are direct and immediately adaptive in life-threatening situations – [while] the benefits of broadened thought-action repertoires emerge over time.’ In a myopic culture, such as encouraged and supported by competitive frames, people tend to react thoughtlessly and defensively to a challenge by rival agents, seeing them as a threat rather than more thoughtfully considering what to do with respect to others from a larger perspective on our social linkages.

However, within a longer-term view, ‘broadened mindsets carry indirect and long-term adaptive value because broadening builds enduring personal resources, like social connections, coping strategies, and environmental knowledge’ that are more closely associated with more expansive planning horizons. Consequently, ‘these findings suggest that positive affect – by broadening exploratory behaviour in the moment – over time builds more accurate cognitive maps of what is good and bad in the environment,’ thus suggesting the vital importance of designing social systems to encourage and foster learning through cooperative frames.

In this way, ‘greater knowledge becomes a lasting personal resource’ which ‘over time ... can transform individuals for the better, making them healthier, more socially integrated, knowledgeable, effective, and resilient.’ Thus, Frederickson and Losada (2005, p. 679) suggest that: ‘This evidence motivates our prediction that positive affect is a critical ingredient within flourishing mental health.’ The problem is that these phenomena are not present in our economic conversations, so they receive little or no weight in our deliberations about the welfare effects of competitive systems, which are simply viewed as always efficient because of implicit and generally unexamined substitution assumptions combined with an ignorance of the physiological and psychological impacts of stressful opposition on human physical and mental health. These are issues in dire need of attention from our profession, if we are to remedy some of the social and cultural harms arising from our institutional systems on our health and functionality, along with our more generalized capacity for social resilience.

g. Adaptive flexibility and local vs. global stability

Because Frederickson and Losada (2005, p. 680) carefully define human emotions as intractably complex ‘multicomponent *systems* that dynamically alter patterns of thinking, behaviour, subjective experience, verbal and nonverbal communication, and physiological activity,’ they also perceive them to reflect ‘two intertwined core concepts within nonlinear dynamic systems – namely, local unpredictability and global stability.’ These authors understand that *adaptive flexibility* is a hallmark of our emotional systems and their physiological impact. After reviewing important research on the plasticity of heart rate variability within a view that ‘fast and accurate perception seems to depend on chaotic neural systems,’ they add: ‘In both cardiac and neurological

systems, then, seemingly unpredictable local changes give rise to stable and flexible global outcomes.'

Frederickson and Losada (2005, p. 680) next apply these findings to human emotional systems, expanding on them in numerous ways: 'Given that positive affect broadens momentary thought-action repertoires whereas negative affect narrows those same repertoires, people are indeed less predictable in positive states than in negative states.' However, in Jennings' work on horizon effects, it has been argued that longer and broader horizons make other people's decisions more and not less predictable, and that therefore private horizon effects cause social horizon effects usually in the same direction. In other words, one person's horizontal growth spreads to infect other people by allegedly increasing the stability of local decision environments, along with generating role model and learning effects on others as well, making other people's reactions more and not less predictable. These psychological findings suggest that such claims of 'interhorizontal complementarity' ought to be questioned or even rejected simply as unsubstantiated assertions.

But such an interpretation would be incorrect. The issue at stake is more complex, subtle and deserves closer attention before reaching a simplistic conclusion about this general claim of 'interhorizontal complementarity' and the contagious effects of (private and social) horizontal shifts. Here is what Frederickson and Losada (2005, p. 680) say on this subject: 'The broaden-and-build theory holds that the momentary unpredictability characteristic of positive states over time yields resilience that allows people to flexibly adapt to inevitable crises.' In other words, this sort of unpredictability is transient and 'momentary,' yielding greater stability, resilience, and predictability on a larger scale, as 'demonstrated empirically at multiple levels of analysis.' Consequently, as they explain, 'people induced to feel positive emotions ... report wider arrays of action urges in the moment' that makes them momentarily less predictable 'within the microdynamics of their moment-to-moment moods.'

But this short-term uncertainty makes people more flexibly adaptable at times of adversity and challenge. Frederickson and Losada (2005, p. 680) cite the example of long-term marriage relationships to illustrate their point: 'Within married couples, greater marital happiness is associated with less predictability from moment to moment as spouses interact, and yet, over time, these marriages are the ones most likely to last.' Business teams operate with each other in much

the same way, where 'higher levels of expressed positivity ... have been linked to greater behavioural variability within moment-to-moment interactions as well as to long-range indicators of business success' along with 'broader information processing strategies and greater variability in perspectives across organizational members as well as to organizational resilience in the face of threat.'

So once dynamics are properly introduced to distinguish short-term and thus more immediate effects from long-term enduring consequences, what we see is a greater resilience and better social stabilization due to an emphasis on positivity in our institutional environments. 'The commonalities between affect systems and nonlinear dynamic systems raise the possibility that the complex dynamics of chaos underlie the proposed link between positive affect and human flourishing.' (Frederickson and Losada 2005, p. 680) The implication is that all of our organizational systems work much better when they promote positive feelings and attitudes toward fellow members of society, rather than when arranged in accord with authoritarian hierarchies in which creativity and personal growth may be stifled along with human higher-order social needs in the Maslovian sense (cf. Maslow 1954, 1968).

h. Interhorizontal complementarity, learning and positivity

As noted already, one might well interpret the findings of Frederickson and Losada as a vital challenge to 'interhorizontal complementarity,' namely, as raising questions about the claim that private 'horizon effects' are socially contagious, if longer horizons make one's short-run behaviour less and not more predictable. But entertaining a broader repertoire of behavioural options – through all learning activity in general – is an integral part of a longer planning horizon; an increase in short-term variability due to a willingness of people to explore novel ideas and alternatives in the pursuit of successful learning will likely be infectious to others. Short-term variability is a part and parcel of learning activity; one tries new things and discovers their previously unknown effects. If so, the complex dynamics of behavioural reactions should be distinguished in terms of transient *vs.* enduring effects of such changes. People who are flourishing (in Frederickson and Losada's sense of that term) have an infectious impact upon others in their circle of friends and relations. Positive feelings spread, with their own external spillover effects on social attitudes.

Here is where the findings of Frederickson and Losada (2005, pp. 680-81) invite us into a larger perspective on these phenomena. They first describe several lines of research to ‘suggest that high ratios of positive to negative affect would distinguish individuals who flourish from those who do not.’ They mention that some ‘studies show that mild positive affect characterizes the modal human experience’ and state: ‘This *positivity offset* equips individuals with the adaptive bias to approach and explore novel objects, people, or situations’ in far more open-minded ways than any defensive posture would allow or invite. Other research reveals that ‘bad is stronger than good’ in the sense that ‘to overcome the toxicity of negative affect and to promote flourishing, experiences of positivity may need to outnumber experiences of negativity,’ to offset, outweigh and counter successfully the more potent impacts of fear and anger on our overall outlooks. This implies ‘that optimal mental health is associated with high ratios of positive to negative affect.’

These findings mean that learning activity is an important aspect of positive emotional affect, the long-run impacts of which show up in the form of ‘global stability’ due to greater resilience in the face of crisis, surprise, or other unexpected disruptions. But there is also a role for ‘negativity’ in our emotional makeup: ‘positivity’ must be genuine to contribute to healthy behaviour. As Frederickson and Losada (2005, pp. 684-85) explain, ‘problems can occur with too much positivity’ because ‘appropriate negativity’ is also important ‘within the complex dynamics of human flourishing. Without appropriate negativity, behavior patterns calcify’ and people grow rigidly ossified and inflexible in patterns steeped in denial. That is why these authors ‘use the term *appropriate negativity* because we suspect that certain forms of negativity promote flourishing better than others’ such as conflict engagement in marriage vs. disgust and contempt which ‘are more corrosive.’

So, Frederickson and Losada’s (2005, pp. 684-85) findings imply that ‘just as negativity ... must be appropriate, positivity must be both appropriate and genuine’ or it won’t have these beneficial effects. Honesty always matters: ‘smiles that are ingenuine or otherwise disconnected from current circumstances lose credibility as expressions of internal states and correlate with regional brain activity typical of negative emotions and abnormal heart function,’ meaning that any form of ‘feigned positivity may be more negative than positive.’ Positivity

must be ‘genuine... – meaningfully grounded in the reality of current circumstances – rather than feigned, forced, or trivial positivity.’

Such a conclusion nicely corresponds with Pert’s (1997, pp. 192-93) point, as introduced above, that ‘*all* emotions are healthy, because emotions are what unite the mind and the body. ... All honest emotions are positive emotions.’ The general point is that there is a whole array of findings about human neurophysiology and neuropsychology that are relevant to economics in regard to how we should organize social institutions that show welfare implications we should understand. The differences between systems of fear-based competition *vs.* cooperative frames based on love and compassion are important to economics. But these findings are also related to other more general issues and insights arising from the field of biology, which issues economists also tend to ignore within orthodox circles. They too bear directly on our institutional choices and our more general analytical outlook on how we might design incentive structures for improved forms of social organization.

i. A further role for biological insight in economics

The institutional arguments suggested above for cooperative over competitive systems for health and horizontal reasons are reflected in an earlier controversy in biology over the nature of evolutionary processes as competitive (e.g., cf. Dawkins 1976), namely as ‘survival of the fittest’ in ‘Nature, red in tooth and claw,’ or cooperative (e.g., cf. Margulis 1998; Feldman 2018; Simard 2021), showing symbiotic connections across various and diverse animal and plant species. Lynn Margulis started a revolution in her field by showing a mounting accumulation of evidence for symbiotic relationships in the natural world, more recently followed by people like Suzanne Simard’s studies of forests in British Columbia that established diversely communicative fungal network connections across different tree species. Such insights suggest that the dominant view of natural processes as being based purely on a competitive struggle is at best incomplete and may be flat wrong. This is much the same argument that Jennings’ work presents in economics about cooperative systems and their economic importance and efficiency (e.g., cf. Jennings 2008a, 2015a, 2016a).

Although these themes can be found throughout heterodox schools of economics such as in Institutional and Ecological Economics, they do not get the emphasis in those specialties that they deserve. The only academic writer who has put

forth a similar economics of abundance and gratitude to what Jennings supports, based on a generalized complementarity based on increasing returns (cf. Kaldor 1972, 1975), is an Indigenous botanist named Robin Wall Kimmerer (2013, 2022). She has written effusively about the open generosity of Nature and how natural abundance should reflect in our human behaviour and deep reverence for the natural world. What Kimmerer describes is an economics of gratitude, generosity and reciprocity derived from an understanding based on a balance between her Indigenous spiritual background and her scientific training as a professional botanist. It is both intriguing and most reassuring that Jennings and Kimmerer have reached nearly identical findings through totally different intellectual routes and angles of vantage.

So, it is contended in this paper that the economic case for cooperation is decisive, not only with respect to its human health benefits, but also because of its overwhelming efficiency and spiritual characteristics as well. Indeed, in two recent papers, Jennings (2015b, 2024) has proffered the proposition that the entire efficiency case for competition in economics has been founded upon a serious and tragic error initiated by John R. Hicks in 1939 and then reinforced by Jack Hirshleifer in 1962. These two papers trace the history of this mistaken assumption of decreasing returns – which brought forth a great deal of work blessed with many Nobel Prizes – when applied to all long-run theory. An economics reframed upon a premise of increasing returns will look quite different; it would demand a dynamic and not static complex system approach that must be general and not partial, and holistic and not piecemeal. The long-delayed emergence of an economics founded on increasing returns, complementarity and planning horizons was summarily pre-empted by both ‘The Hicksian Getaway’ and ‘The Hirshleifer Rescue’. This shift of paradigmatic emphasis is still sorely needed.

Conclusion and summary

So now we reach the point where all this information needs to be summarized, synthesized, and drawn together, to tie up this paper. The primary question that has been asked here is: How should we organize society to promote human well-being? The basic issue is whether competition or cooperation is a superior means to social welfare. Most economists have been trained to see the case for

competition as the very apex of efficiency and optimality. But in network contexts that incorporate fully interdependent phenomena, substitution, and complementarity both occur together in a complexly intractable mixture. If so, then because complementarity finds cooperation efficient, the efficiency claims for competition ought to be questioned in this regard.

Should substitution or complementarity rule over economics? It has long been asserted (with scant dissent) that substitution and scarcity models of opposition reside at the core of economics, while complementarity is ignored or at least gets very short shrift (e.g., cf. Richardson 1959, pp. 233-34), due to a broad acceptance of diminishing over increasing returns in economic production (cf. Jennings 2024). There is no foundation for diminishing returns assumptions, save in short-run production theory (Jennings 2015b); the general long-run technical case will favour increasing returns, implying a generalized complementarity in all long-run applications (cf. Kaldor 1972, 1975). Furthermore, substitution does not apply to intangible outputs ('bits') and horizontal effects ('wits'); here the case for cooperation is strong and well-supported (Jennings 2015a, 2016a). The point of this paper is to make a more robust claim for cooperation on the basis of its widespread health benefits.

First, the two cultures of competition and cooperation were characterized – too simplistically – as cultures of fear and love, where the former (rivalry) emphasizes stress and strife in human relations based on a mistaken view that we all share a basic conflict of interests in the allocation and distribution of economic goods. So, competition places us in opposition to each other in an individualistic culture dominant in Western nations, and therefore reinforces a social environment too resistant to human community and devoted to personal acquisition and advancement against one's peers' similar efforts. All of us are familiar with these rivalrous systems.

What has been characterized as this culture of fear is contrasted here with an alternative and more Eastern culture of cooperation, based on an economic recognition of increasing returns and complementarity, yielding a belief and general understanding that human relations are characterized more accurately as showing a broad concert of interests. In this setting, community counts, as will the total and all-encompassing interdependence of phenomena, such that

caring and compassion are the twin hallmarks of an economic culture of abundance and love in line with Kimmerer's (2013) lofty conceptions.

Furthermore, the role and relevance of 'horizon effects' were raised, to add that longer and broader horizons are also important for any comprehensive evaluation of these two systems. Such criteria, although unfamiliar to most economists, suggest that learning activity and adaptive flexibility in a dynamic, complexly interdependent domain of action are important as standards for any proper assessment of system performance in the economics of social organization for human well-being. Competition and cooperation entail economic cultures of 'fear' and 'love' for the purposes of this paper; which of these social systems seem more conducive to human social welfare? Research in human neuropsychology and physiology offers an answer that stretches beyond the previous arguments as presented in Jennings (2017ab).

A suggestion was also offered from management theory on the cultural impact of hierarchical organizations that treat their members as if they were children through authoritarian dictates: that symptoms of ill health – of 'frustration, failure, short time perspective and conflict' – would likely result, disruptive of functionality and fragmenting effort through rising 'competition, rivalry, intersubordinate hostility and ... a focus toward the parts rather than the whole' (Argyris 1971, pp. 262-63, 268-69). This could be more generally construed as an apt description of pathologies infused within our economic culture, along with the additional insight that these persistent and ubiquitous styles of behaviour may indeed be pathological symptoms of mental illness attributable to higher-order need deprivation (cf. Maslow 1954, 1968), much in the way that Douglas McGregor (1971, pp. 310-11) described as leading to a superficial materialistic cultural focus.

Kohn's (1986, pp. 55, 143) view of competition was even more negative, that 'competition ... does not promote excellence. ... The chief result of competition ... is strife.' For many organizational theorists, an economic culture of competition is part of the problem, manifesting pathological symptoms in the ensuing behaviour reflected in horizon effects and widespread organizational stress, suggesting that our fear-based system manifests serious and dangerous signs of spiritual and emotional loss.

Some findings in neuropsychology also imply a competitive failure in the social provisioning process in its intended promotion of human health and well-being. Designing a social world around the opposition of interests is not conducive to flourishing human communities if we are social creatures, as many psychologists say. If human beings are also hard-wired for empathy, or implicitly programmed by evolution in favour of fellowship – protecting each other along with ourselves through affinity links – such competitive frames sever relations, suggesting deeply harmful effects on our social well-being.

Indeed, a great deal of research shows social support to be an important part of physiological functionality, psychological health, and economic welfare. Social isolation and loneliness has been tied to illness and disease of various sorts – as ‘a major risk factor for morbidity and mortality’ – and will affect ‘one’s daily emotional life’ (Norris and Cacioppo 2007, p. 88). The World Health Organization calls stress ‘one of the most significant health problems in the 21st century’ as it is ‘a close correlate or even a determining factor of the onset of different diseases’ (Kudielka et al. 2007, pp. 56-57) such as abnormal heart rhythms, immunosuppressive failures, susceptibility to infection, and diabetes, to name a few (Taylor and Gonzaga 2007, p. 456). Indeed, if humans are born with ‘an affiliative neurocircuitry ... in response to stress’ and ‘if social contacts are hostile or unsupportive’ – as is likely in a culture of competitive ‘fear’ – then psychological and biological stress responses are heightened. If social contacts are supportive and comforting, stress responses decline’ (Taylor and Gonzaga 2007, p. 457). An economic culture resistant to affiliative responses shall lead to widespread ill health, both mental and physical. These are realms of inquiry that imply our competitive frames exhibit some very serious shortcomings, and thus are not conducive to optimal levels of ‘efficiency’ as so many economists say.

Indeed, positive feelings have important health benefits; the suppression of anger, for example, is linked to cancer and other diseases (Pert 1997, pp. 190-93). Emotional states also affect the heart, implicated not only in cardiovascular health but in what the Institute of HeartMath calls ‘psychophysiological coherence’ which plays a vital role in harmonizing bodily rhythms and maintaining optimal mental function along with emotional balance. Here, ‘love and appreciation’ are routes to such coherence with contagious social effects (McCraty, Bradley and Tomasi 2004/5, pp. 16-18): ‘In short, positive emotions appear to broaden the scope of perception, cognition, and behaviour and to

enhance creative and intuitive capacities,' while 'conversely, negative emotions tend to restrict perception, produce more reactive, rigid, and stereotypic patterns of thought and action, and have been found to be associated with reduced task performance and impaired intuitive judgments.' The horizontal implications of this research are very clear, that 'appreciation, care, compassion and love' (Tomasino 2007, pp. 530-31) along with 'giving [and] nurturing' – all 'aspects of human experience that are associated with wholeness' (Arguelles, McCraty and Rees 2003, p. 20) – should be duly encouraged by any socioeconomic institutional system meant to promote human welfare or 'flourishing.'

The notion of 'flourishing' entails living 'within an optimal range of human functioning' (Frederickson and Losada 2005, p. 680). Positive feelings, especially toward other people, are an essential feature of flourishing in this sense; a competitive fear-based system meets none of these social requirements, whereas a more cooperative frame encouraging care and compassion for others, such that love fosters healthy relationships along with better human performance, is strongly conducive to social welfare in all its diverse senses.

Much of the notion of 'flourishing' is *horizontal* at its core. Extended planning horizons seem so much in line with these studies that the economics and the psychology all come together here. Opening up planning horizons as an index of maturity, social connection and personal growth offers psychology and economics an organizing principle likely to offer research opportunities in both fields. Such collaboration ought to open new realms of understanding for all of us who strive for improvement in our social spheres. With psychologists showing how longer and broader planning horizons might be encouraged effectively, and economists seeing horizontal lengthening as a complementary process in economic development (e.g., cf. Jennings 2009e), the needed shift in social cultures away from opposition and competition toward cooperation and compassion could be achieved, especially in light of more recent advances in biology also noted above. The orthodox substitution assumptions in economics simply are wrong – or at least far too restrictive – and they have harmful effects in all the realms addressed in this paper. Is it not time for renewal, to move from fear into love for each other?

Endnotes

[1] A great deal of interesting research can be found in the Research Library at the HeartMath Institute on how our cardiovascular rhythms respond to a wide diversity of external and emotional influences.

[2] The authors' use of the term 'ratio' in this context suggests that positive vs. negative feelings can be quantified, which is not the case.

Conflict of Interest Statement

No conflict of interest has been identified in relation to this manuscript.

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Frederic B. Jennings Jr. received his Bachelor of Arts degree (1968, *magna cum laude*) in economics from Harvard College and his Ph.D. degree in economics in 1985 from Stanford University. In 1998, he started *The Center for Ecological Economic and Ethical Education* in Ipswich, MA (USA), under the auspices of which he has written, presented and published many academic papers developing various aspects of a new economics based on increasing returns, complementarity, and planning horizons. He is a member of the Advisory Board of *The Journal of Philosophical Economics* (ecologicaleconomics@yahoo.com).