

APPENDIX 2. Decomposition of event structure metaphors and conceptual blending of primary metaphors

1. Decomposition of event structure metaphors

System is a physical structure. See Analysis section in the main text.

States are locations, Changes are movements, Causes are forces. In neoclassical economics, the state of the economic system and its individual actors can in embodied terms be described as a lonely rider on the uphill slope striving to maximize his money and power. The more money and power he has been able to accumulate, the higher up on the slope he is. The uphill movement continues forever and any downhill slide is only temporary. As a reflection of the role of ecosystem services in the economy, the slope does not erode from traveling on it (Table 1, column 2). In contrast, the dynamics of the adaptive cycle of a socio-ecological system can be described as a roller coaster track. System state is determined by location along the roller coaster track, following the cyclic growth and dissipation of potential, connectedness and resilience (Table 1, column 3).

Actions are self-propelled movements, Purposes are destinations, Means are paths, Expected progress is travel schedule. In the neoclassical economy, lonely riders are the actors whose purpose is to stick to the uphill path, to stay ahead of the others in the competition, to remain inside the vehicle and to maintain the vehicle in good shape (Table 1, column 2). In the adaptive cycle, the society is the actor, moving at variable speed along the roller coaster track. The purpose is to maintain the adaptive capacity of the system by building and repairing the track. Progress is not maximal but optimal speed along the track. Interestingly, growth and dissipation are each other's means: growth requires dissipative turns on the track and vice versa (Table 1, column 3).

Difficulties are impediments to motion, External events are large moving objects, Long-term purposeful activities are journeys. For the lonely rider in a neoclassical economy, the purposeful life is spent speeding uphill ahead of others. The occasional recession is like a landslide causing an uncontrolled slide downhill. Regulation is having to carry a heavy burden or encountering rough terrain (Table 1, column 2). In contrast, the purpose of a socio-ecological system is a pleasant roller coaster ride. Systemic breakdown is like a collapsing roller coaster track. Regulation becomes a difficulty for the system if it prevents experimentation with safe roller coaster track design (Table 1, column 3).

2. Conceptual blending of primary metaphors

System is a physical structure. See Analysis section in the main text.

States are locations, Changes are movements, Causes are forces. In the conceptual blend, the adaptive roller coaster riders are those who remain linked together on the roller coaster track. Sometimes, but not always, they may even have wealth like their counterparts in the neoclassical input space. This is because wealth, which is the equivalent of potential in the adaptive cycle, is contingent upon growth and dissipation in the two other dimensions of the adaptive cycle, namely, connectedness and resilience. Wealth is high or increasing in two types of situation, namely, when resilience diminishes in the conservation (K) stage of the adaptive cycle or when connectedness diminishes in the reorganization (α) stage. Wealth is low or diminishing when resilience is low in

the release (Ω) stage of the adaptive cycle or when both resilience and connectedness increase in the exploitation (r) stage (Figures 2 and 3). The management instruction that emerges from these tradeoffs for the roller coaster riders is not to maximize wealth but rather coordinate it with connections and resilience to maintain optimal movement along the roller coaster track. Obviously, a smooth ride presumes good maintenance of the roller coaster track (Table 1, column 4).

Actions are self-propelled movements, Purposes are destinations, Means are paths, Expected progress is travel schedule. The riders' collective movement in a roller coaster along the cycle-shaped track has the overall purpose of remaining adaptive during the ride. Adaptation in turn is made of several attributes, including riders who maintain the roller coaster and the track, stay inside the vehicle during the ride, keep the vehicle on the track and experiment with the safe limits of roller coaster speed. Some riders may even change roller coasters at the bottom station, reflecting the socio-ecological system's ability to both influence the dynamics of lower level systems and be influenced by higher level systems (Holling 2004). In striving to achieve these purposes, the riders must pay attention to tradeoffs inherent in the ride dynamics: to achieve growth in one desired dimension requires an acceptance of reductions in other dimensions. Advancement of one's personal career is judged in terms of its contribution to achieving an optimal speed during the collective ride (Table 1, column 4).

Difficulties are impediments to motion, External events are large moving objects, Long-term purposeful activities are journeys. Difficulties and opportunities are also in a tradeoff. Statements of difficulties in the blend are themselves blends between primary metaphors expressing difficulties in neoclassical economics and primary metaphors expressing means in adaptive cycle theory. Recession, for example, is gaining speed in a downhill to be able to climb up the next uphill slope on the roller coaster track; and losing competition is waiting for the right moment to climb up. If regulation becomes a difficulty, it is because it prevents experimentation with safe roller coaster design and operation. The worst that can happen is a complete breakdown of the socio-ecological system, which is like a collapsing roller coaster. The best that can happen is a pleasant roller coaster ride with fellow riders (Table 1, column 4 and Figure 3).