Thought Experiments

Here, I appeal to thought experiments to explore the implications of different definitions of three concepts. The goals are to eliminate problematic definitions and reach a consistent and operational concept of SD. I assume a CHANS can be represented by an aggregated index Q which designates per capita quality of life.

Q is a function of q_is and t, $Q_t(q_i)$, where q_is are quantitative and qualitative (ordinal) indicators of the system, and t is a point in time. I refrain from explicating the relationship between Q and q_is at this point.

1. Development

Consider a scenario (figure 1) where two CHANS evolve as follow:

$$\{(Q_{pre}, Q_{post}), (Q_{pre}, Q_{post})\}.$$

Which of the following five measures capture development the best?

D_1: $\Delta Q = Q_{post} - Q_{pre} \neq 0$

D_2: $\Delta Q = Q_{post} - Q_{pre} > 0$

D_3: $\Delta Q = Q_{post} - Q_{pre} \geq 0$

D_4: $\Delta_m Q = Q_t - Q_m \geq 0$

D_5: $\Delta_{CF}Q = Q_{post} - Q'_{post} > 0$ (where Q'_{post} is the counterfactual state that no intervention was made)
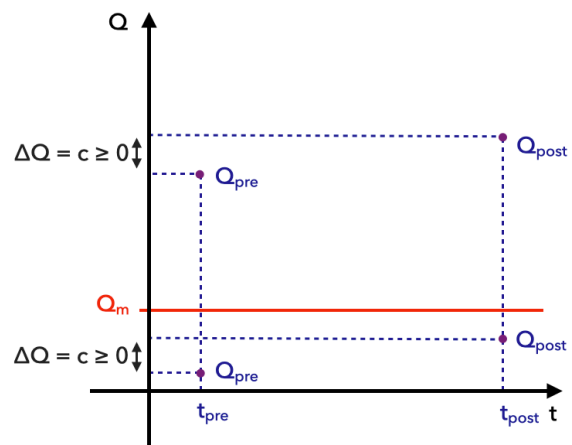
Figure 1. Does development require a minimum quality of life?

Based on D_5, development can be taken as a counterfactual improvement where Q_{post} is contrasted with a hypothetical situation where an intervention is absent (Q' in figure 2). In other words, we have development if Q at t_{post} is higher than it could be if no intervention was made.
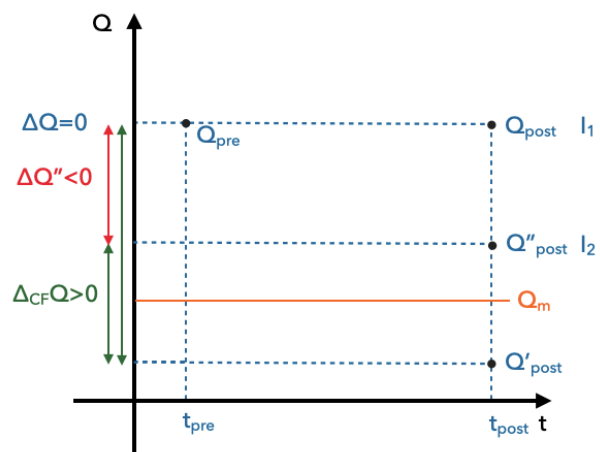
Figure 2. Development as Counterfactual Improvement in QoL.

2. Sustainability

Which of the following four measures capture sustainability the best?

> Is sustainability a non-negative measure?
>
> S_1: Constancy: $\Delta Q = Q_{post} - Q_{pre} = 0$.
>
> S_2. Non-declination: $\Delta Q = Q_{post} - Q_{pre} \geq 0$.
>
> S_3. Maximum: $Q_t \leq Q_t^{Max}$.
>
> S_4. Minimum: $Q_t \geq Q_{min}$

Figure 3. Which measure capture sustainability the best?

3. Justice

Rawls' two principles of justice:

- "First Principle: Each person is to have an equal right to the most extensive total system of equal basic liberties compatible with a similar system of liberty for all.
- Second Principle: Social and economic inequalities are to be arranged so that they are both:
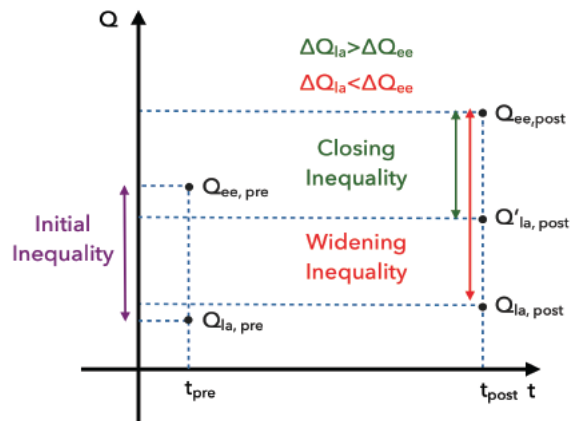
Figure 4. Which measure encapsulate Rawls' view better?

  - (a) to the greatest benefit of the least advantaged, consistent with the just savings principle, and
  - (b) attached to offices and positions open to all under conditions of fair equality of opportunity."

Consider two scenarios (figure 4) for a system compromising two subpopulations: "la" and "ee." These scenarios have the same start points, $\{(Q_{ee,pre}),(Q_{la,pre})\}$, but different endpoints, $\{(Q_{ee,post}, Q_{la,post})$ and $(Q_{ee,post}, Q'_{la,post})\}$.

Which measures capture Rawls' view of justice the best?

> J_1. $\Delta Q_{la} \geq 0$.
>
> J_2. $\Delta Q_{la} > \Delta Q_{ee}$.
>
> Assumption: Rawlsian justice requires comparing at least two sub-populations: the "least advantaged" (la) and everyone else (ee).
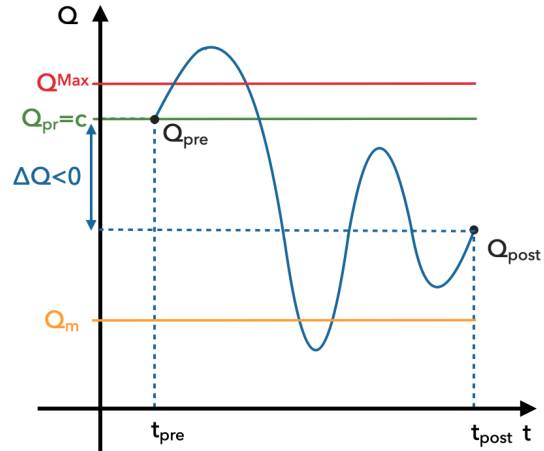
4. Sustainable Development

Suppose we are at the maximum sustainable QoL (Q^M) at the global scale. Also, assume there is no population change ($\Delta Pop. = 0$) or prospect for new discoveries and innovations ($Q_{pre} = Q_{post} = Q^M$) within a multigenerational time horizon (t_{pre}, t_{post}). So, Q^M remains the same over time. The question is can we have SD on a lower scale if we have SD globally?

Consider a scenario (figure 5) where the system evolves as follows:

$\{(Q_{pre}=Q^M, Q_{post}=Q^M), (Q_{ee, pre}, Q_{ee, post}), (Q_{la, pre}, Q_{la, post})\}$.

Where Q is the net quality of life for the entire population (global), Q_{la} is QoL for the least advantage subpopulation, and Q_{ee} is the counterpart for the rest of the population.
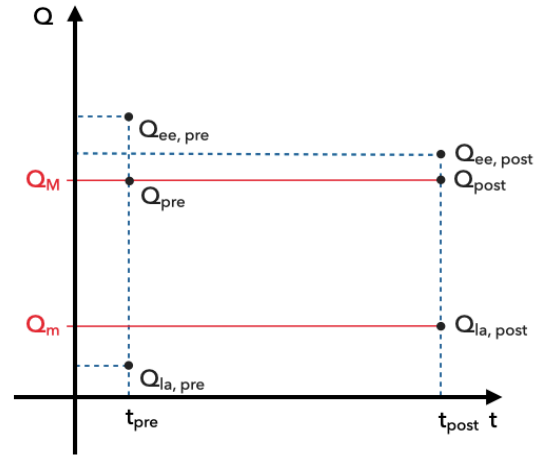

Figure 5. Is SD applicable at different scales simultaneously?

Which combination of concepts $\{(D_1, D_2, D_3, D_4, D_5), (S_1, S_2, S_3, S_4), (J_1, J_2)\}$ provides a consistent and Pragmatic idea of SD?