The positive net profit space is a subspace of the transfer space

Friedrich, Thomas

Humboldt-Universität zu Berlin

11 February 2024

The positive net profit space is a subspace of the transfer space

T. Friedrich

The substrate concentration in source and sink and the combined net profit of the ensemble of both are the coordinates of the transfer space. Net profit is the difference of a non-linear benefit function and a linear cost function of the substrate concentration. The net profit of the ensemble, the sum of the net profit of source and sink, results in a surface within the transfer space. This surface is partially below zero, a negative net profit, and partially above zero, a positive net profit. Superadditivity appears when the surface with transfer is above the surface without transfer. Subadditivity is the revers situation. Superadditivity and subadditivity are independent of a positive or negative net profit. A positive net profit for the single parties and superadditivity for the ensemble would be optimal.

I demonstrate that in a subspace of the transfer space (area III) a positive net profit for source and sink and superadditivity for the ensemble is possible. Two reservations have to be made: First, source has to be forced or deceived to give substrate beyond b=c, an attractor within the larger transfer space. Second, increased positive net profit for source and sink in symmetric ensembles is achieved on cost of superadditivity for the ensemble. The superadditive net profit of the ensemble by transfer and the individual net profit of source and sink are a trade-off within the subspace. If the individual net profit for source and sink is maxed out simultaneously, superadditivity is absent and additional transfers result in subadditivity in symmetric ensembles. Observing both limits of maximal net profit avoids subadditivity in area III. This is similar to the transfer space with the holding lines b=c. Such a pair of checklines is absent in area II.

source, sink, ensemble, transfer, superadditivity, subadditivity, force, deception, Solow-Swan model, trade-off, net profit, emergent cost, karoshi, greed, envy, contempt

Introduction and initial considerations

A force is an external agent capable of changing a body's state of rest or motion. It has a magnitude and a direction. A hungry animal searching for food, a consumer working to earn money are not in rest. They are active to satisfy a need. Though this need has an internal origin, it can also be viewed as a force. The force comes from an imbalance of a biologic system. The force will drive the system back to a state of balance. Based on a balance of benefit and cost in a source of substrate and in a sink of that substrate I formulated the model "transfer space" (1).

The benefit b in source and sink is a saturating function of the substrate concentration according to Michaelis-Menten:

b=bf*Vmax*[S]/([S]+Km)

where bf is the benefit factor, here always 1 b*min/µmol; b is a placeholder for other units like KJ or € or $. Vmax is the maximal reaction velocity (µmol/min), [S] is the substrate concentration (mM), and Km is the Michaelis-Menten constant (mM).

The variable cost c in source and sink is a linear function of the substrate concentration (no fixed cost):

c=cf*[S]

Here, cf is the cost factor (c/mM) and [S] is the substrate concentration (mM). The variable cost c is a placeholder for units like KJ or € or $.

The force acting on the single parties (source and sink) of the transfer space are similar to the forces within the Solow-Swan model (2, 3). There, depreciation (a linear function) and investment (a saturating function) reach an equilibrium. Similarly, source and sink either seek to decrease cost (a linear function) or try to increase benefit (a saturating function). The point of equilibrium is an attractor in both cases (figure 1).

Figure 1

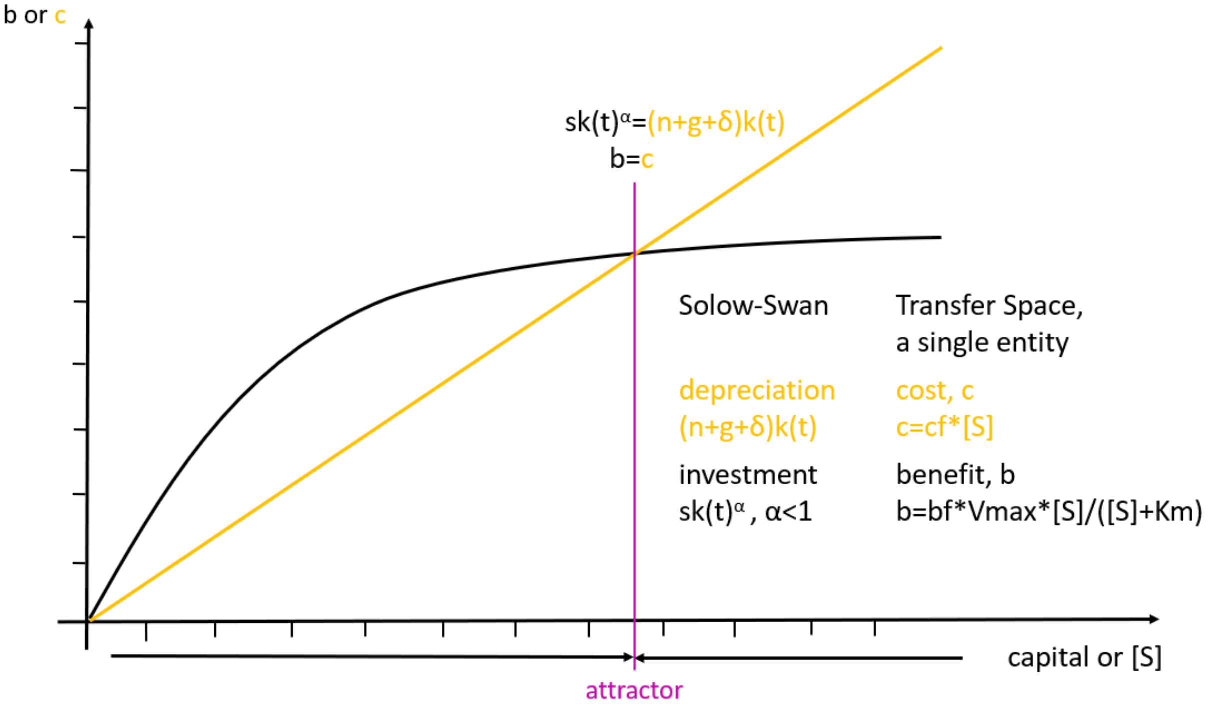


Figure 1

The black graph is the result of a saturating function. The orange graph is the result of a linear function. A fixed cost is not considered. The black arrows below the x-axis show the direction of the force towards the attractor. In the transfer space the single entity can reach the attractor only from a single direction and only in coordination with the other party. This is the most important difference to the Solow-Swan model.

There are differences and similarities between both models: Within the transfer space source and sink complement each other to reach the equilibrium. Source can only give and approach b=c from high concentrations. Sink can only take and approach b=c from the opposite direction, *i.e.* low concentrations. In the Solow-Swan model the equilibrium can be approached independently from both sides.

Technological progress in the Solow-Swan model is mirrored by mutational changes of *e.g.* Km, Vmax (the features of an enzyme) or other components of the benefit and cost functions of the transfer space. Because many adjusting screws can be turned, the saturating benefit function has a more variable shape in comparison to the simple Cobb-

Douglas function. The central similarity is the origin of the driving force. The behaviour of source and sink and the Solow-Swan model is governed by the attempt to reach an equilibrium. This equilibrium is $sk(t)^{\alpha}=(n+g+\delta)k(t)$ in the case of the Solow-Swan model and $bf*Vmax*[S]/([S]+Km)=cf*[S]$ in the case of the transfer space. Source and sink can be entangled (4), which is not used here.

An important difference to the two-dimensional Solow-Swan model is that source and sink are independent of (orthogonal to) each other and therefore form a three-dimensional space (figure 2).

Figure 2

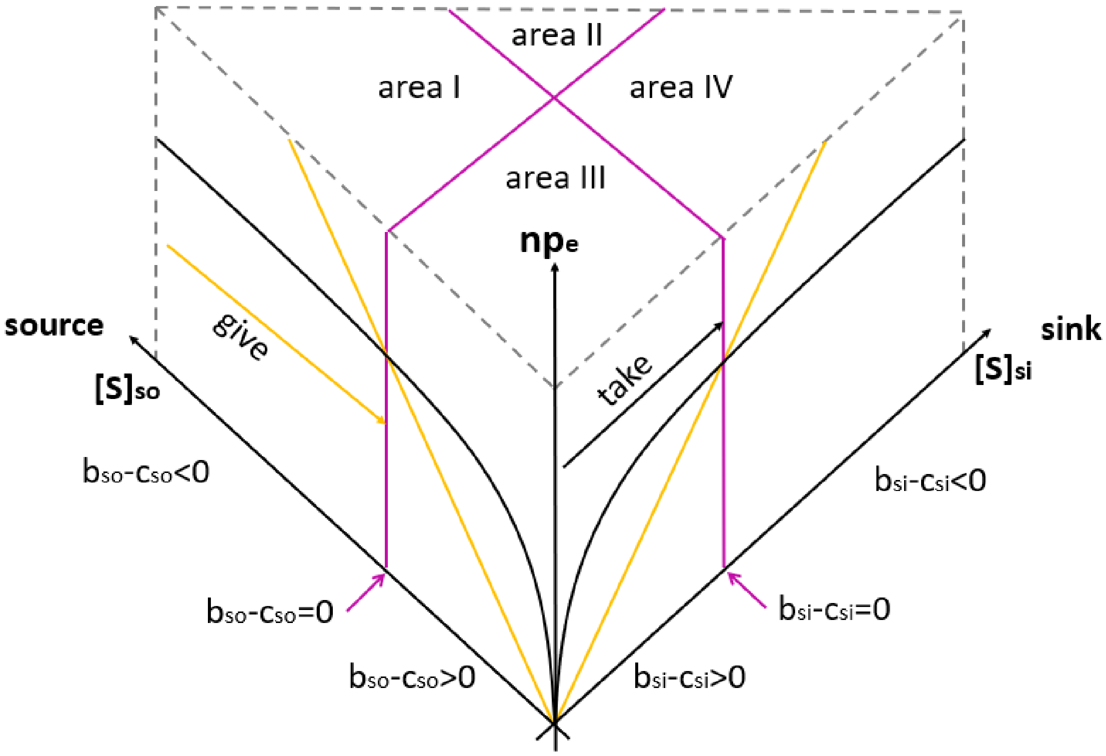


Figure 2

The transfer space of a source and a sink. The coordinates are substrate concentration in source ($[S]_{so}$), sink ($[S]_{si}$), and net profit (np_e) of both parties (ensemble) either without (inactive ensemble) or with (active ensemble) a transfer. The attractors of source and sink are marked by purple lines. Source and sink are two-dimensional entities. They can´t measure the higher dimension, *i.e.* the space. Their benefit and cost functions are depicted on the sides of the prism shaped transfer space. The attractors divide the transfer space into 4 areas with different behaviour and outcome.

The transfer of substrate from source to sink is controlled by the conservation laws and runs diagonally through the space. The forces acting on source or sink to reach b=c are orthogonal. In the transfer space we do not only look at a single entity with two opposing forces but at the interaction of two entities where the forces and direction to reach b=c are distributed asymmetrically (figure 2). This asymmetry is always present, even in biochemically symmetric ensembles.

The purple lines passing through b=c of source and sink divide the prism into 4 domains. It is known from my older calculations - and will be shown again in the results section - that the net profit of the ensemble with transfer of substrate (active) results in superadditivity or subadditivity in comparison to the ensemble without transfer (inactive) due to the non-linear benefit function. Therefore, it is not a zero-sum game. The inactive ensemble is used as a reference to understand the effect of a transfer.

In symmetric ensembles source and sink share identical benefit and cost functions. Area I in a symmetric ensemble without a fixed cost is a peaceful area with only superadditivity and transfers at free will (figure 3). Source wants to get rid of cost domination (c>b) and sink wants to increase benefit domination (b>c). Transfer is easy as they are in close contact. They complement each other completely or, at least and more often, partially.

Area II and III are transitional areas. Part of the area is superadditive and another part is subadditive. Here, force and deception against one party by an internal or external master are necessary to induce a transfer. Area III is an area where source and sink have both a positive net profit. In area II source and sink have both a negative net profit.

Area IV is an irrational area where a transfer will always result in subadditivity. Only an external master can force or deceive a rational ensemble to be active in area IV. A second possibility for activity in this area may be a lack of information. Both parties may not know the location of the limits b=c. Then area IV could be entered unsuspecting in ignorance or overestimation even in the absence of a master.

In figure 3 the transfer space of an ensemble is depicted in a top-down view. This type of depiction will reappear in the result section as calculated data.

Figure 3

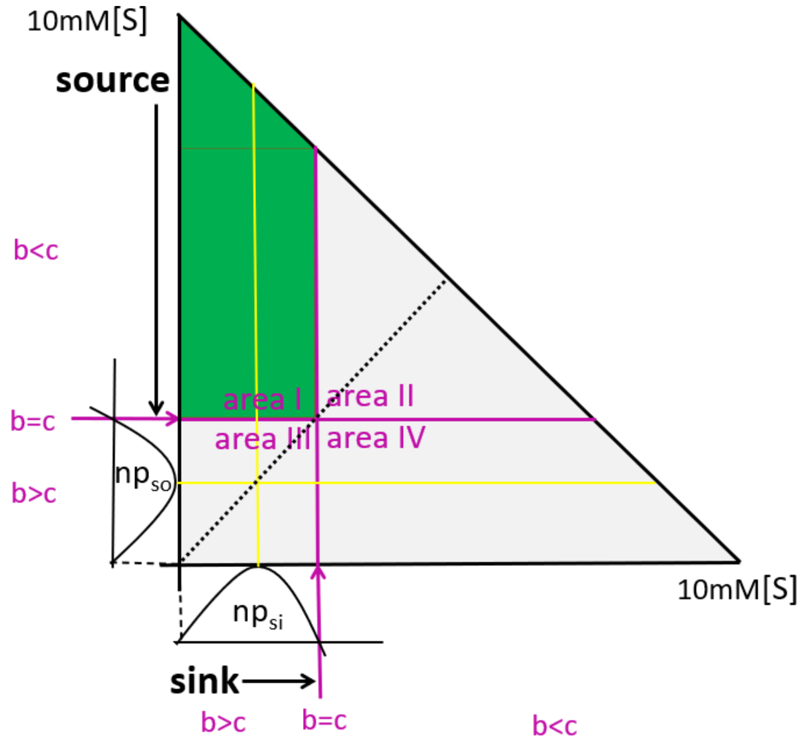


Figure 3

The model predicts (green area I) a peaceful transfer at free will with a superadditive result for the symmetric ensemble. Area II and area III are accessible by force and deception against one party. Superadditivity as well as subadditivity are possible results. Area IV is an irrational area and only accessible by force or deception through an external master or ignorance. Activity (transfer within or into) this area always leads to subadditivity. The black dotted line is the line of mixing, *i.e.* equal concentration in source and sink. In symmetric ensembles it separates super- and subadditivity.

The shape of the net profit function (np) appears unfolded to the side of the triangle of the top-down viewed prism shaped transfer space. The black arrows indicate the inner forces (inner motivation) of the ensemble to reach b=c in source and sink. The yellow lines mark the maximal net profit in source or sink. Their intersection locates the maximal net profit of the ensemble (not to scale and proportion).

The net profit of a single party and super- or subadditivity of the ensemble are independent. Superadditivity and subadditivity follow a transfer. Depending on the size of the transfer two changing negative net profits may materialise superadditivity. Subadditivity may come from changing positive net profits. This is the consequence of nonlinear functions.

Source and sink are not necessarily equal (symmetric) and independent entities. The ensemble may be dominated by a master. There are different master types. At first it is possible to discriminate internal and external masters.

An internal master is a dominating source or sink. This is an asymmetry of means but this asymmetry does not reside within the benefit or the cost function. It is an additional feature with costs and benefits, but they are not part of the calculations.

An external master is a third party. I observe several subtypes. The honest broker as an external master connects source and sink if they are not in direct contact. He may have costs to do so and he may extract some benefit for himself but this is not considered here. Then there is a conditional violent and deceptive and an unconditional violent and deceptive type of master. The conditional type is only active when source or sink are not active, that is outside of area I. The unconditional type is always active as he does not respect or know the limit b=c of source and sink (5, 6). Finally, there is the prudent master in two variants (conditional and unconditional). He knows in a symmetrical ensemble how to avoid subadditivity. This is the adjustment of the same amount of substrate in source and sink and is essentially mixing. Mixing is an act of violence as it destroys compartmentalization (1). All possible costs of the different masters and the benefit they may extract are not part of the calculations. Only the effect on the ensemble is observed.

Activity in area I of the transfer space is in the real world probably a rare event. Source would have to be burdened with substrate (c>b) and simultaneously sink would have to have a lack of the same substrate (b>c). Then the ensemble would produce superadditivity after a transfer at free will. In the real world there will be more often either a lack of benefit for both parties (area III, general scarcity of substrate, source will not give) or there will be an overflow of burden for both parties (area II, too much substrate with a dominating cost, sink will not take). However, in area II and area III there is still superadditivity possible which may offer an advantage to the ensemble and will give a master the opportunity to extract a value.

A Homo economicus possesses the following features: He is not necessarily a human, he is acting rational, he has fixed preferences, he wants to maximize his benefits, he wants to minimize the cost, and he has all necessary information (including genetic information). Therefore, I would conclude that the Homo economicus as a source or as a sink or as an ensemble will be only active in area I. In case a master wants to activate an ensemble outside of area I - a real world setup - he has to force or deceive the ensemble to do so. Deception will only work if the ensemble has no longer all information. Weakness is somehow a lack of information. The information how to build a stronger weapon or stronger muscles (genetic information) or a stronger (convincing) counter argument.

In figure 4 the external master or a sink as master has introduced a new mindset to maximize net profit (np=max). I call this an “outer motivation” in contrast to the “inner motivation” (b=c). The determination of np=max is a more complex achievement than the simple comparison of a benefit and a cost because several differences have to be calculated and memorized and compared in space and time. This ability is probably a feature of complex organisms.

As source is only able to give and sink is only able to take, the directionality of the setting is clear. The activity with respect to the net profit of both parties may again complement each other but may also be antagonistic.

Figure 4

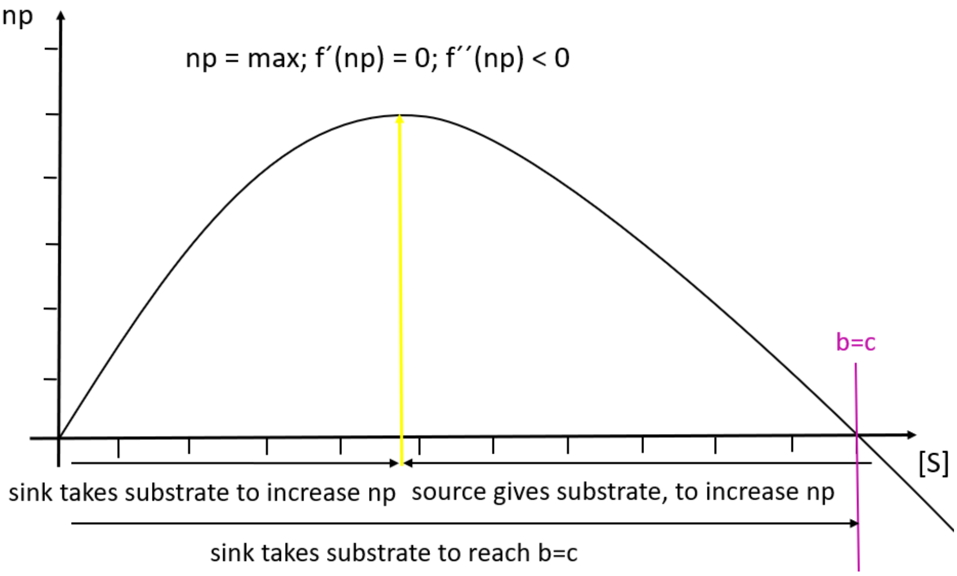


Figure 4

The outer motivation to maximize individual net profit induces a new target (np=max, yellow line). This will result in activity outside of area I in area III. When net profit is low the substrate concentration in source can be further decreased or increased in sink. The limit b=c is no longer observed by source. Sink will experience inner and outer motivation to be in harmony or in conflict.

The new goal - outer motivation - of source and sink to maximize net profit activates the ensemble in area III. In area III, according to the structure of the transfer space, source is always acting against its basic aim to reach b=c (inner motivation). Source is deflected from its equilibrium and should act now as a sink. Sink, in contrast, is always in accordance with its inner motivation. Source and sink share the outer motivation to increase net profit (figure 5). But similar to the aim to reach the equilibrium b=c in the transfer space this is not always possible for both sides simultaneously and will lead to conflicts, too.

Figure 5

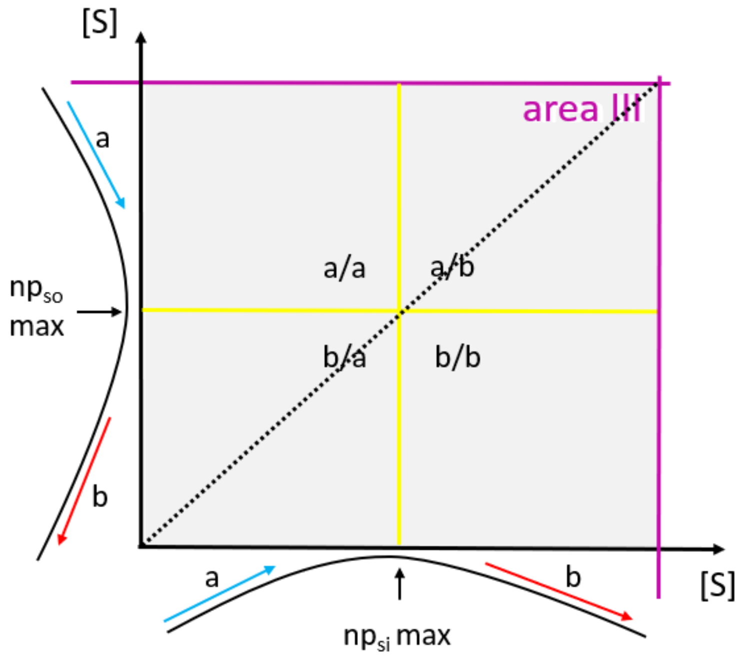


Figure 5

Here, area III is enlarged (compare figure 3). In this area the outer motivation is activated. Source and sink try to maximize their individual net profit. Area III is now subdivided into 4 subareas by two yellow lines (subarea a/a, a/b, b/a, and b/b). These yellow lines mark the maximal net profit in source or sink. The purple borders of the positive net profit subspace are the borders of area III. The dotted line is the line of mixing. The size of the subareas and location of the target limit (np=max, outer motivation) are neither to scale nor to proportion. The blue arrows indicated increasing net profit and the red arrows indicate decreasing net profit.

Like area I in figure 3, subarea a/a of area III seems to be the most preferable area as both parties are able to increase their respective net profit. Subarea a/b and subarea b/a, similar to area II and area III of the transfer space, seem to be of transitory nature. While one party will be able to increase net profit, the other party suffers a decrease in net profit; a built-in conflict. Transfers at low concentrations (near zero) in source and concentrations near b=c in sink will decrease net profit for both parties. However, here sink is still in accordance with the inner motivation.

Results

The symmetric ensemble:

The structure, behaviour, and outcome of the symmetric ensemble has been discussed in the introduction. The values used for all calculations are: [S] = 0mM to 10mM (1µM steps); the concentration pairs in source and sink always add up to 10mM. Km = 0.5mM, Vmax = 5µmol/min, bf = 1b min/µmol, cf = 5/3 c/mM in the symmetric ensembles. The equilibrium b=c (inner motivation) is at 2.5mM in source and sink. When force or deception is used, the final concentration is 1.5mM in source and 3.5mM in sink; an additional 1mM is transferred (10% of the total amount). In the symmetric ensemble the maximal net profit of source and sink is at a substrate concentration of 0.7247mM.

The concentration limit of area III is 2.5mM in source (2.5mM to 0mM) and sink (0mM to 2.5mM). This becomes the positive net profit subspace with an outer motivation. If so, this subspace has new inner targets subdividing that subspace again into 4 subareas. The target is 0.7247mM in source and sink. This target, again like the transfer space, can only be reached in coordination with the other side. In subarea *a/a* both parties transfer at free will according to their outer motivation. Beyond the target concentration conflicts according to the outer motivation will occur. To observe the effect of force and additional deception in the positive net profit space (area III) an additional 0.25mM (10% of the subspace) is transferred beyond the target concentration in one (unconditional) or two steps (conditional). Source gives from 0.7247mM to 0.4747mM and sink takes from 0.7247mM to 0.9747mM.

When mixing is investigated, a concentration pair with different concentrations before transfer will have equal concentrations after the transfer in the transfer space or in the net profit subspace. In the model a transfer from sink to source is not possible. The conditional equalizing prudent master respects the ensemble when active and equalizes the concentration only outside of area I in the transfer space and subarea a/a in the positive net profit subspace. The unconditional equalizing prudent master is always active equalizing the concentration differences.

In addition, I investigate asymmetric ensembles and compare them with the symmetric ensemble. There are two types of asymmetric ensembles; weak and strong asymmetric ensembles.

The weak asymmetric ensemble:

In weak asymmetric ensembles the source is better suited for productivity (lower cost or lower Km or higher Vmax). The ensemble is weak because, in comparison to a symmetric ensemble, less concentration pairs are suited for the production of superadditivity after transfer.

The values used for all calculations are: [S] = 0mM to 10mM (1µM steps); the concentration pairs in source and sink always add up to 10mM. Km = 0.5mM, Vmax = 5µmol/min, bf = 1b min/µmol, cf = 10/7 c/mM in source and 2 c/mM in sink. The equilibrium b=c (inner motivation) is 3mM in source and 2mM in sink. When force or deception is used, the final concentration is 2mM in source and 3mM in sink; an additional 1mM is transferred. In the weak ensemble the maximal net profit is at a substrate concentration of 0.8229mM in source and at 0.618mM for sink.

The concentration limit of area III is 3mM in source and 2mM in sink. As the depiction will be a square, the line of mixing will be flat compared to the symmetric ensemble. This area becomes the positive net profit subspace with an outer motivation. If so, this subspace has new inner targets subdividing that subspace again into 4 subareas. The target is a substrate concentration of 0.8229mM for source and a substrate concentration of 0.618mM for sink. This target, again like the transfer space, can only be reached in coordination with the other side. In subarea a/a both parties transfer at free will according to their outer motivation. Beyond the target concentration conflicts according to the outer motivation will occur. To observe the effect of force and additional deception in the positive net profit space (area III) an additional 0.25mM is transferred in one or two steps beyond the target concentration. Source gives from 0.8229mM to 0.5729mM and sink takes from 0.618mM to 0.868mM.

When mixing is investigated, a concentration pair with different concentrations before transfer will have equal concentrations after the transfer in the transfer space or in the net profit subspace. In the model a transfer from sink to source is not possible. The conditional equalizing prudent master respects the ensemble when active and equalizes the concentration only outside of area I in the transfer space or subarea a/a in the positive net profit subspace. The unconditional equalizing prudent master is always active equalizing the concentration differences.

The strong asymmetric ensemble:

In strong asymmetric ensembles sink is better suited for productivity (lower cost or lower Km or higher Vmax). The ensemble is strong because, in comparison to a symmetric ensemble, more concentration pairs are suited for the production of superadditivity after transfer.

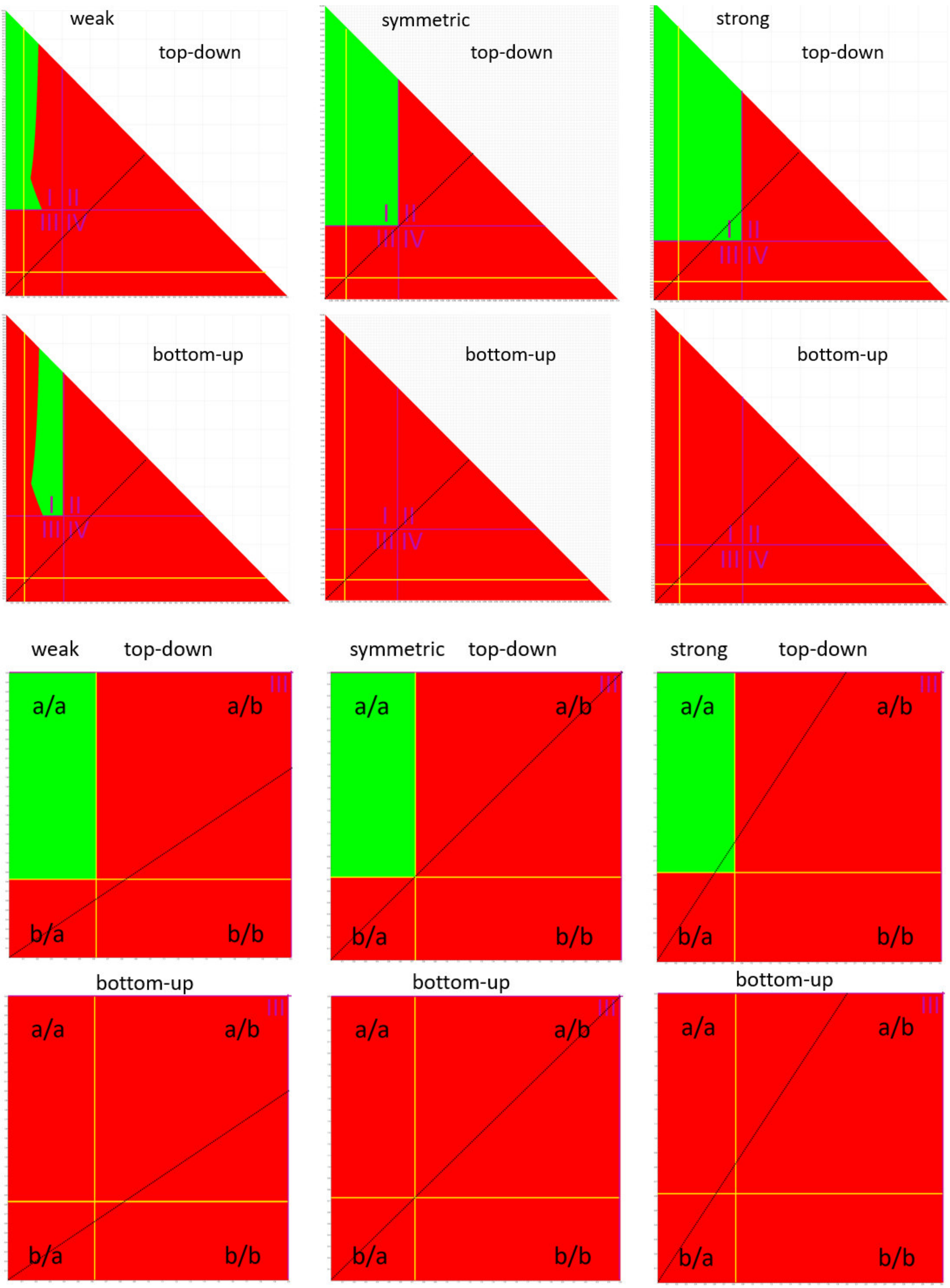
The values used for all calculations are: [S] = 0mM to 10mM (1µM steps); the concentration pairs in source and sink always add up to 10mM. Km = 0.5mM, Vmax = 5µmol/min, bf = 1b min/µmol, cf = 10/7 c/mM in sink and 2 c/mM in source. The equilibrium b=c (inner motivation) is 2mM in source 3mM in sink. When force or deception is used the final concentration is 1mM in source and 4mM in sink; an additional 1mM is transferred. Here, the maximal net profit of source is at a substrate concentration of 0.618mM and for sink is at a substrate concentration of 0.8229mM.

The concentration limit of area III is 2mM in source and 3mM in sink. As the depiction will be a square, the line of mixing will be steeper than in the symmetric ensemble. This becomes the positive net profit subspace with an outer motivation. If so, this subspace has new inner targets subdividing that subspace again into 4 subareas. The target is a substrate concentration of 0.618mM for source and a substrate concentration of 0.8229mM for sink. This target, again like the transfer space, can only be reached in coordination with the other side. In subarea a/a both parties transfer at free will according to their outer motivation. Beyond the target concentration conflicts according to the outer motivation will occur. To observe the effect of force and additional deception in the positive net profit space (area III) an additional 0.25mM is transferred beyond the target concentration in one or two steps. Source gives from 0.618mM to 0.368mM and sink simultaneously takes from 0.8229mM to 1.0729mM.

When mixing is investigated, a concentration pair with different concentrations before transfer will have equal concentrations after the transfer in the transfer space or in the net profit subspace. In the model a transfer from sink to source is not possible. The conditional equalizing prudent master respects the ensemble when active and equalizes the concentration only outside of area I in the transfer space or subarea a/a of the positive net profit subspace. The unconditional equalizing prudent master is always active equalizing the concentration differences.

Starting in figure 6 I qualitatively compare the transfer space based on an inner motivation with the positive net profit space (area III) based on the outer motivation in symmetric and asymmetric ensembles according to the structure and location of superadditive and subadditive regions. Transfer space and positive net profit space of the same type always share identical benefit and cost functions. Source and sink differ in asymmetric ensembles, but they obey both the inner or outer motivation.

Figure 6



weak
top-down
I II
III IV
symmetric
top-down
I II
III IV
strong
top-down
I II
III IV
bottom-up
I II
III IV
bottom-up
I II
III IV
bottom-up
I II
III IV
weak top-down
a/a a/b
b/a b/b
symmetric top-down
a/a a/b
b/a b/b
strong top-down
a/a a/b
b/a b/b
bottom-up
a/a a/b
b/a b/b
bottom-up
a/a a/b
b/a b/b
bottom-up
a/a a/b
b/a b/b

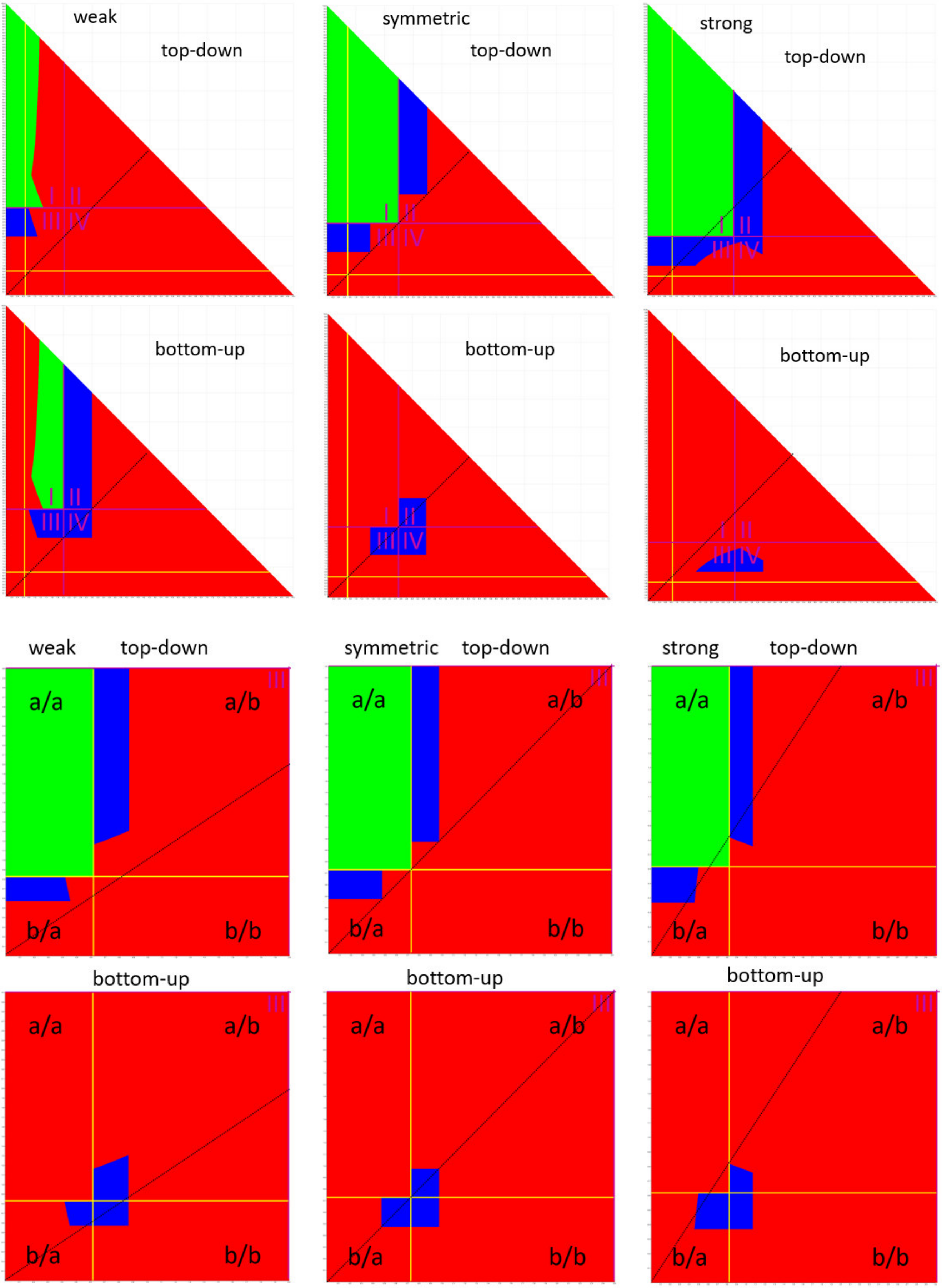
Figure 6

The effect of an honest broker on different types of ensembles is depicted. The triangular shaped transfer space (top two rows: top-down and bottom-up) with the inner motivation b=c and the rectangular shaped positive net profit subspace (bottom two rows: top-down and bottom-up) with the outer motivation to maximize positive net profit are displayed. The columns from left to right show weak ensembles, symmetric ensembles, and strong ensembles. In all pictures we look at net profit as a function of the substrate concentrations in source and sink with transfer (green, free will) or without transfer (red). They differ in their motivation. Superadditivity is visible in the top-down perspective (green above red), subadditivity in the bottom-up perspective (green below red). The limit b=c is characterized by purple lines dividing the transfer space into 4 areas (I, II, III, and IV). The maximal net profit in source and sink (np=max) is indicated by yellow lines. However, only in the positive net profit space np=max is a target. Area III is subdivided into 4 areas by two yellow lines separating 4 new subareas: a/a, a/b, b/a, and b/b). The black dotted line is the line of equal concentration.

In figure 6 we observe peaceful transfers in three different ensemble types (weak, symmetric and strong) mediated by an honest broker. In the transfer space source and sink stop at their respective limit b=c. The weak ensemble, at free will, produces lots of subadditivity. Only sink could reach the maximal net profit but ignores it. The ensemble is active only in area I.

After the introduction of a new mindset - outer motivation - into source and sink, the ensemble becomes partly active in area III (positive net profit space), *i.e.* the subarea a/a. Here, the maximal net profit can be reached, but in most of the cases only either for source or for sink. A maximal net profit for source and sink is simultaneously achievable only on a single path. Although this activity is, according to the rules of the transfer space, induced by deception, it is depicted in green within the positive net profit space as it is at free will in the new mindset! However, source may feel a conflict of inner and outer motivation. Under the new mindset subadditivity is not observable in the weak ensemble. Weak, symmetric, and strong ensembles can´t be discriminated within the positive net profit subspace. I only qualitatively investigate the distribution of superadditivity and subadditivity. The quantity will differ as cf differs. A fixed cost would also change the picture (4).

Figure 7



weak
top-down
I
II
III
IV
symmetric
top-down
I
II
III
IV
strong
top-down
I
II
III
IV
bottom-up
I
II
III
IV
bottom-up
I
II
III
IV
bottom-up
I
II
III
IV
weak
top-down
a/a
a/b
b/a
b/b
symmetric
top-down
a/a
a/b
b/a
b/b
strong
top-down
a/a
a/b
b/a
b/b
bottom-up
a/a
a/b
b/a
b/b
bottom-up
a/a
a/b
b/a
b/b
bottom-up
a/a
a/b
b/a
b/b

Figure 7

The effect of a conditional violent and deceptive master on different types of ensembles is depicted. Activity by free will is in green, first transfer. Activity by force or deception is in blue, second transfer; always with respect to inner motivation (b=c) or outer motivation (np=max). Superadditivity is visible in the top-down perspective, subadditivity in the bottom-up perspective. Further details in the legend to figure 6.

In figure 7 we observe ensembles with a conditional violent and deceptive master. The surface area of superadditivity within the transfer space increases in the sequence from weak ensemble to symmetric ensemble to strong ensemble. Similarly, the subadditive area decreases in the same sequence. This is again only a qualitative assessment. Subadditivity is prominent near the intersection of the limits b=c.

The positive net profit space with the engrained outer motivation to maximize net profit behaves differently. The qualitative distribution of superadditivity and subadditivity is very similar in weak, symmetric, and strong ensembles. This is easily explained when we look again into the pictures of the corresponding transfer space. There, force and deception create superadditivity within area III. The limit of the maximal net profit in source and sink makes use of this. Above the line of mixing and within the limits of maximal net profit superadditivity is present (figure 14). This is true within the limits of the selected values. Therefore, force and additional deception within the positive net profit space create superadditivity. The border to subadditivity is at or near the line of mixing. In addition, the three ensemble types have similar shapes of super- and subadditivity. This all could be different with different values of the functions or a different transfer size. Again, this is no quantitative statement. However, when the net profit of source and sink is nearly maxed out simultaneously, further transfers are subadditive. There, a further transfer by force or additional deception is not advisable. Net profit and superadditivity are a trade-off.

Figure 8

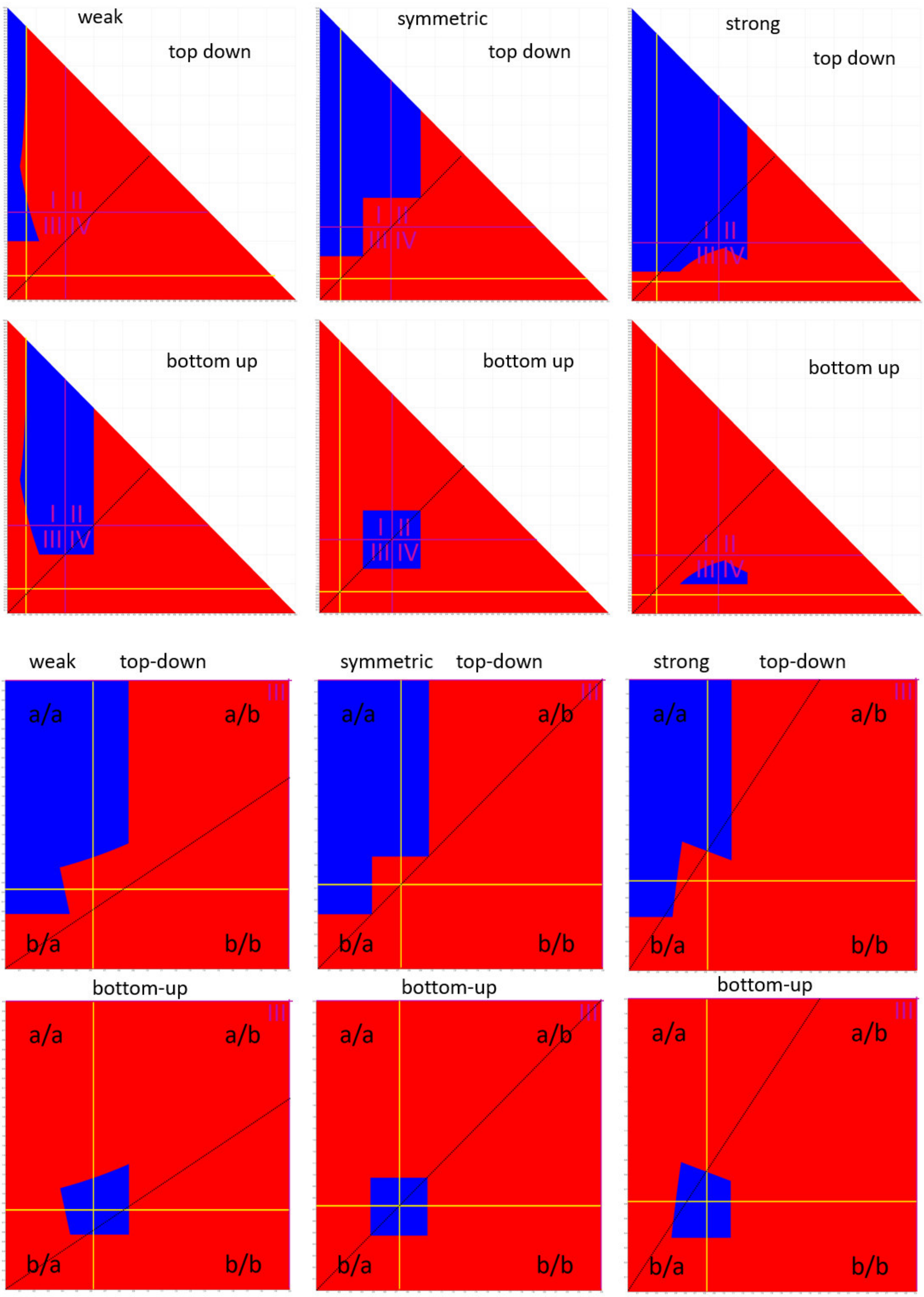

weak
top down
I II
III IV
symmetric
top down
I II
III IV
strong
top down
I II
III IV
bottom up
I II
III IV
bottom up
I II
III IV
bottom up
I II
III IV
weak top-down
a/a
a/b
b/a
b/b
symmetric top-down
a/a
a/b
b/a
b/b
strong top-down
a/a
a/b
b/a
b/b
bottom-up
a/a
a/b
b/a
b/b
bottom-up
a/a
a/b
b/a
b/b
bottom-up
a/a
a/b
b/a
b/b

Figure 8

The effect of an unconditional violent and deceptive master on different types of ensembles is depicted. The legend is identical to figure 6. Activity by free will is absent. Activity by force or deception is in blue (a single transfer to the final limit); always with respect to inner motivation (b=c) or outer motivation (np=max). Superadditivity is visible in the top-down perspective, subadditivity in the bottom-up perspective.

In figure 8 we observe an ensemble with an unconditional violent and deceptive master. Within the transfer space superadditivity increases and subadditivity decreases in the order weak ensemble, symmetric ensemble, and strong ensemble. The subadditivity in the weak ensemble of the transfer space has further increased. But there is still superadditivity left of the line of sinks maximal net profit and mixing in area I and III. This implies for the positive net profit space (area III) that an unconditional violent and deceptive master, in ignorance of the limits of maximal net profit for source and sink, does not dramatically change the pattern of superadditivity and subadditivity when transferring 0.25mM of substrate beyond the target of maximal net profit. However, this type of master enters area IV or subarea b/b. Thereby he infects area I and subarea a/a with subadditivity. Again, subadditivity appears where both single parties are near their maximal net profit. The ensemble is harmed while the single party approaches maximal net profit. Not knowing the limits harms the ensembles. It seems to be better to transfer beyond the limit (figure 7) when you know the limit (two steps) than to blindly transfer.

In the following figures I am going to mix the substrate only. In every concentration pair where the concentration of source is larger, the concentration in source and the concentration in sink are added and divided by two. The target concentration of the transfer is now the line of mixing (dotted black line). Mixing can be understood as an act of violence destroying compartmentalization (1).

Figure 9

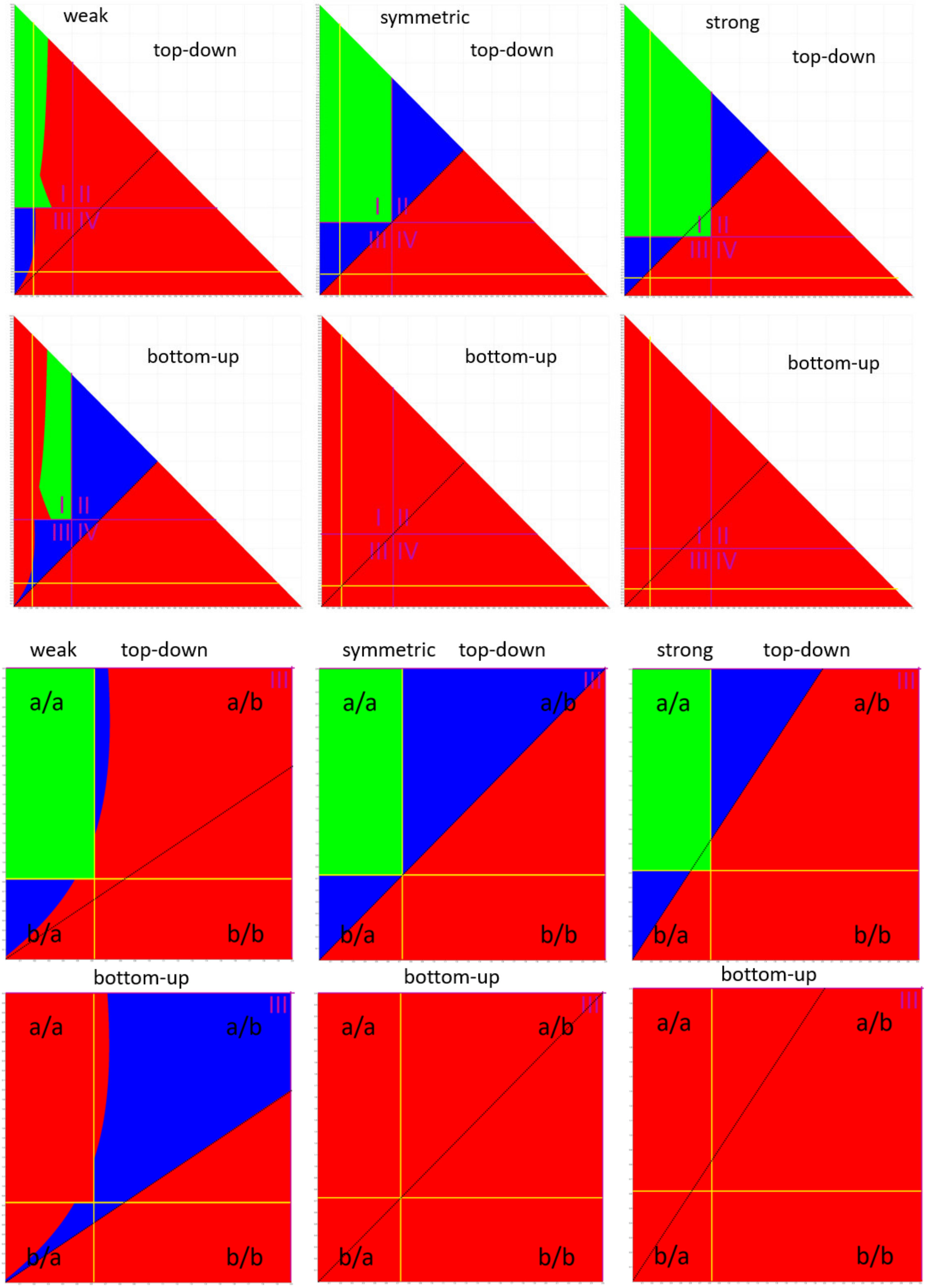

weak
top-down
I II
III IV
symmetric
top-down
I II
III IV
strong
top-down
I II
III IV
bottom-up
I II
III IV
bottom-up
I II
III IV
bottom-up
I II
III IV
weak top-down
a/a
a/b
b/a
b/b
III
symmetric top-down
a/a
a/b
b/a
b/b
III
strong top-down
a/a
a/b
b/a
b/b
III
bottom-up
a/a
a/b
b/a
b/b
III
bottom-up
a/a
a/b
b/a
b/b
III
bottom-up
a/a
a/b
b/a
b/b
III

Figure 9

The effect of a conditional equalizing prudent master on different types of ensembles is depicted. The legend is identical to figure 6. Activity by free will is in green (first transfer). Activity by force or additional deception is in blue (second transfer, mixing); always with respect to inner motivation (b=c) or outer motivation (np=max). Superadditivity is visible top-down, subadditivity bottom-up.

At first, I have to explain the usage of the word “prudent” for this type of master. In a symmetric ensemble the adjustment of equal concentrations in source and sink is the best a master can do to maximize the production of superadditivity; that is prudent. The same reason makes us stir vessels with enzymatic or other chemical reactions. Thereby we avoid a local imbalance of too much substrate and too much catalyst harming the reaction rate.

In figure 9 mixing within the transfer space and it´s subspace has a dramatic effect on the weak ensemble. In a weak ensemble with a conditional equalizing prudent master many concentration-pairs result in subadditivity. The usage of the word “prudent” here seems to be irony. However, the activity at free will with outer motivation (a/a) is still a reasonable subarea and completely superadditive. Here, the master just should not mix. To equalize concentrations in weak ensembles is a mistake in the transfer space and in the positive net profit space. The situation in the transfer space is the worst as there is subadditivity even in a total peaceful situation (figure 6).

The difference between the symmetric and the strong ensemble is much less obvious. Only a small triangle on the other side of the line of mixing is superadditive in the strong ensemble. A conditional master is only active when the ensemble is inactive. This difference will vanish in the next figure and both types will become identical (figure 10).

Figure 10

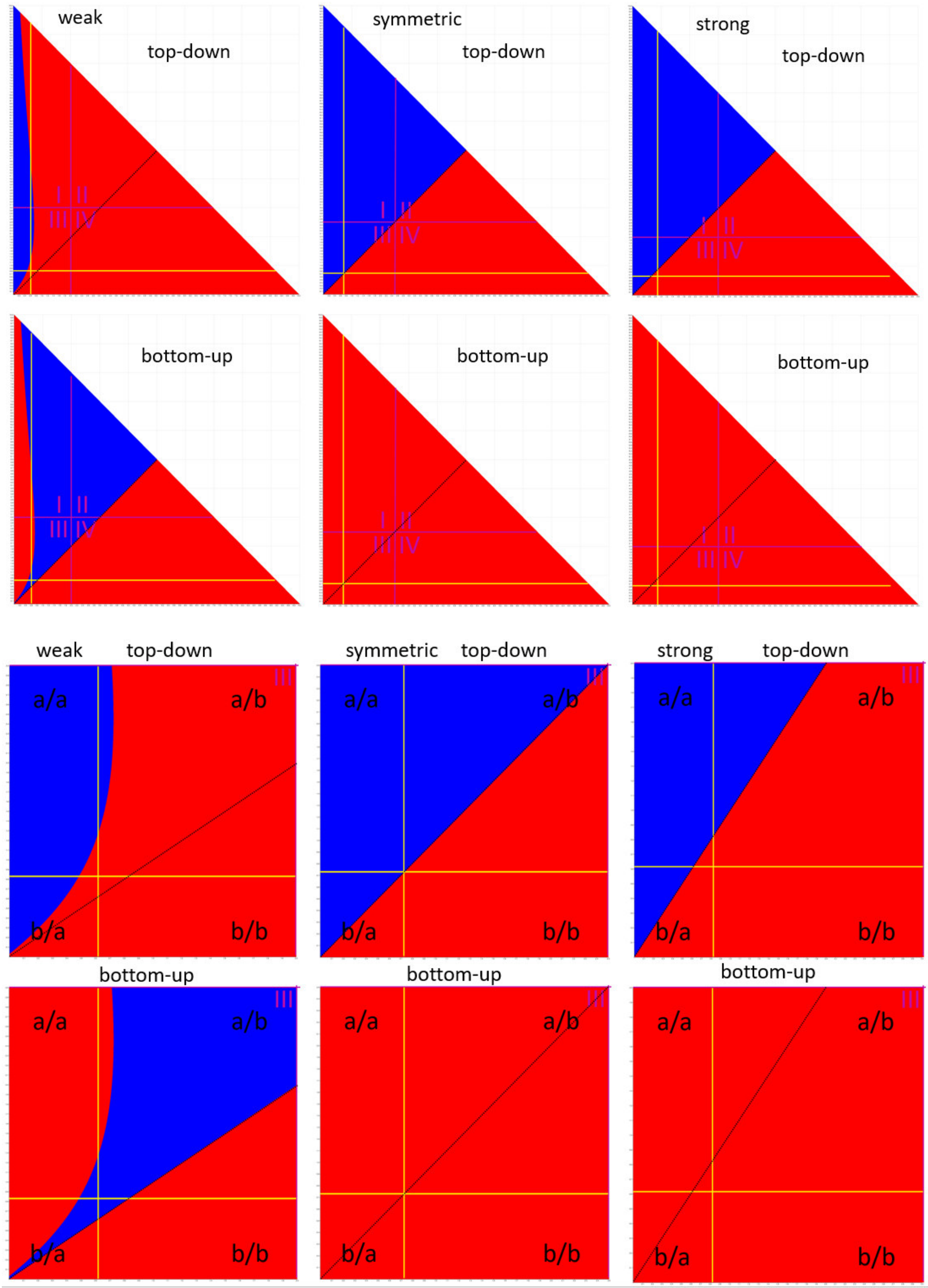

weak
top-down
I II
III IV
symmetric
top-down
I II
III IV
strong
top-down
I II
III IV
bottom-up
I II
III IV
bottom-up
I II
III IV
bottom-up
I II
III IV
weak top-down
a/a
a/b
b/a
b/b
III
symmetric top-down
a/a
a/b
b/a
b/b
III
strong top-down
a/a
a/b
b/a
b/b
III
bottom-up
a/a
a/b
b/a
b/b
III
bottom-up
a/a
a/b
b/a
b/b
III
bottom-up
a/a
a/b
b/a
b/b
III

Figure 10

The effect of an unconditional equalizing prudent master on different types of ensembles is depicted. The legend is identical to figure 6. Activity by force (mixing, a single transfer step) is in blue; always with respect to inner motivation (b=c) or outer motivation (np=max). Superadditivity is visible in the top-down perspective, subadditivity in the bottom-up perspective.

The transfer space of all three types (weak, symmetric, strong) is very similar to their counterparts of figure 9. However, the superadditivity of the weak ensemble has further decreased and the subadditivity has increased. Similar to figure 8, weak ensemble, the intersection of the lines of maximal net profit is within the subadditive region of the transfer space. In figure 8 this also happens to both other types. The subadditivity of the weak ensemble appears where both single parties are near or at their maximal net profit; a perplexing situation. To repeat it: The two single parties will observe a maximized net profit, however the ensemble suffers subadditivity. Perplexing outcomes are the default setting of weak ensembles in the net profit subspace and transfer space.

The symmetric and the strong ensemble have become practically indistinguishable in the transfer space and in the positive net profit space. However, in the strong ensemble there is a waste of possible superadditivity. This becomes clear by comparison to figure 8 and 9. The reason is that mixing can no longer reach the intersection of b=c or np=max in source and sink of the strong ensemble. The small area on the other side of the line of mixing is no longer accessible. Maximal net profit for both parties is no langer possible, as substrates would have to be distributed unevenly in favour of sink.

The differences and similarities of the positive net profit space and the transfer space are summarized in a table 1.

Table 1

	ensemble space	positive net profit subspace
dimensions	three dimensions, two substrate concentration axes, one net profit axis	three dimensions, two substrate concentration axes, one net profit axis
the force in source and sink	inner motivation to approach b=c	outer motivation to approach np=max
intrinsic limits	two limits are formed, the limit is “benefit equals cost” for source and sink	two limits are formed, the limit is the maximal net profit for source and sink
division of the space	the two limits divide the space into 4 areas	the two limits divide the subspace into 4 subareas
giving and taking is at free will according to inner or outer motivation	area I free will by inner motivation	area a/a free will by outer motivation
sink is forced or deceived to take substrate according to inner or outer motivation	area II sink moves beyond b=c	area a/b sink moves beyond np=max
source is forced or deceived to give substrate according to inner or outer motivation	area III source moves beyond b=c	area b/a source moves beyond np=max
both parties are forced or deceived to give and take substrate according to inner or outer motivation, irrational	area IV source and sink beyond b=c	area b/b source and sink beyond np=max
The space or subspace consists of	area I, II, III, and IV, they form the transfer space	area a/a, a/b, b/a, and b/b, they form the positive net profit subspace and are area III of the transfer space.
number of paths to an optimal outcome with respect to the motivation for both parties	only one path	only one path
symmetric ensemble	no subadditivity in the absence of force or deception	no subadditivity in the absence of additional force or additional deception
weak asymmetric ensemble: source: lower Km, higher Vmax, lower cf, higher bf, source is a better place to produce than sink	lots of subadditivity in area I	little subadditivity in area a/a
strong asymmetric ensemble: source: higher Km, lower Vmax, higher cf, lower bf, sink is a better place to produce than source	few subadditivity	few subadditivity

It would be worth to investigate the effect of a fixed cost in source and sink and what happens when the fixed cost changes. Or I could investigate what happens when the benefit and the cost function change in a time dependent manor. I could investigate what happens when the benefit function and the cost function in source and/or sink are no longer identical in the transfer space and in the positive net profit space. Many permutations are imaginable. What seems interesting is a case in which the Km in the source differs between the benefit function of the positive net profit space and the transfer space. In biochemistry a lower Km is interpreted as an increase in affinity towards the substrate and a higher Km is interpreted as a decrease in affinity towards the substrate. It is imaginable that an outer motivation by brute force and an outer motivation by conviction may differ considerably. An easily detectable physical force against source could induce an increased affinity towards the substrate - to keep it. On the other side, if source is deeply convinced of the importance to give the substrate, Km might be increased, easing the transfer considerably and decreasing subadditivity. In addition, brute force could considerably lower Vmax through the feeling of oppression. If the force is replaced by an undetected deception this could release an enormous productivity. The explosion of possibilities can´t be investigated in this single paper.

Now I want to investigate what happens if source or sink do not observe their own limit within the positive net profit space. Source could be forced or additionally deceived to go beyond np=max. Source might give substrate to complete exhaustion. On the other side, sink could no longer care for np=max but go further to b=c. The inner motivation would dominate the outer motivation. This will be investigated in figures 11, 12, and 13. The self-harming behaviour of source will be called “karoshi” (death by overworking), the harmful behaviour of sink “greed”.

Karoshi and greed in the weak ensemble:

Figure 11

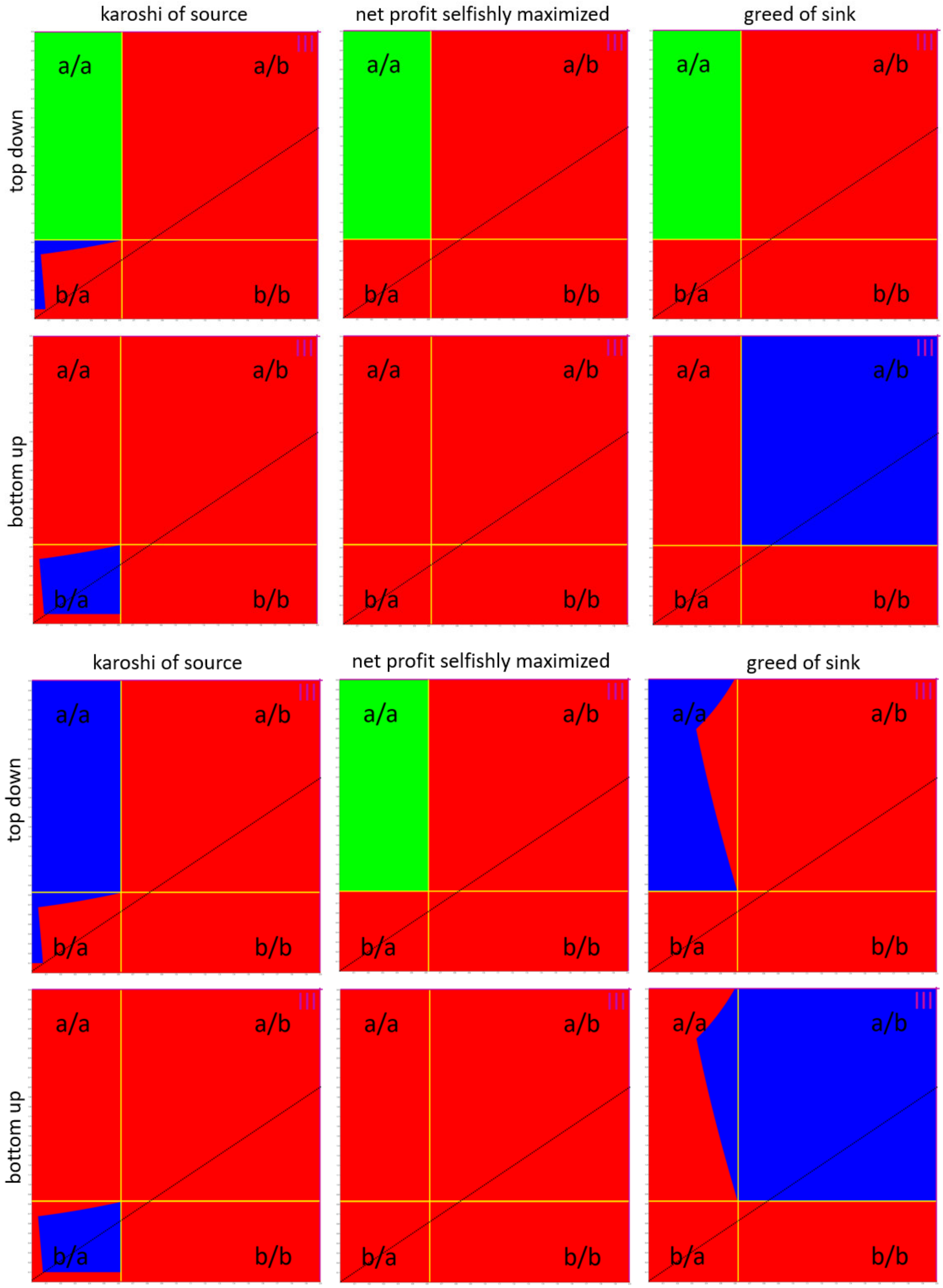


Figure 11

Here we observe weak asymmetric ensembles within the positive net profit space. The left column always shows karoshi of source, the middle column always an ensemble where both sides selfishly maximize their own net profit and stay within their borders (np=max), and the right column depicts greed of sink. Green indicates an action by free will with respect to the outer motivation, blue an action by force or additional deception in the light of the outer motivation. The upper two rows show a conditional violent and deceptive master (top-down and bottom-up), the lower two rows show an unconditional violent and additional deceptive master (top-down and bottom-up). The upper limit of source is 3mM. In karoshi of source np=max (0.618mM) is not respected on the source side. Source stops to give at 0.1mM. In greed of sink np=max (0.8229mM) is not respected. Sink stops at b=c (2mM). Further details see figure 6.

Source is either forced or additionally deceived, although it might look like free will, to move in one or two steps to the new limit (0.1mM). In sink a third-party master might be present but is not necessary. In such a case the outer motivation would be overruled by the inner motivation.

It is obvious that greed is completely harmful to weak ensembles as lots of subadditivity is created and no additional superadditivity is observable. This is true for conditional violence and additional deception as well as unconditional violence and additional deception. Greed is in the unconditional case especially harmful as subadditivity infects subarea a/a.

This is different to karoshi of source. A few of the transfers are superadditive. However, conditional and unconditional behaviour leads to strong subadditivity in most cases. Again, this is a qualitative observation. In a quantitative assessment we would observe that the small amount of superadditivity is more than overcompensated by the total amount of subadditivity. In a complete balance even the superadditivity from subarea a/a would be partially consumed, reducing the total amount of available superadditivity.

Both behaviours are harmful to the ensemble and to the single party. In the case of sink at least the inner motivation is satisfied.

Karoshi and greed in the symmetric ensemble:

Figure 12

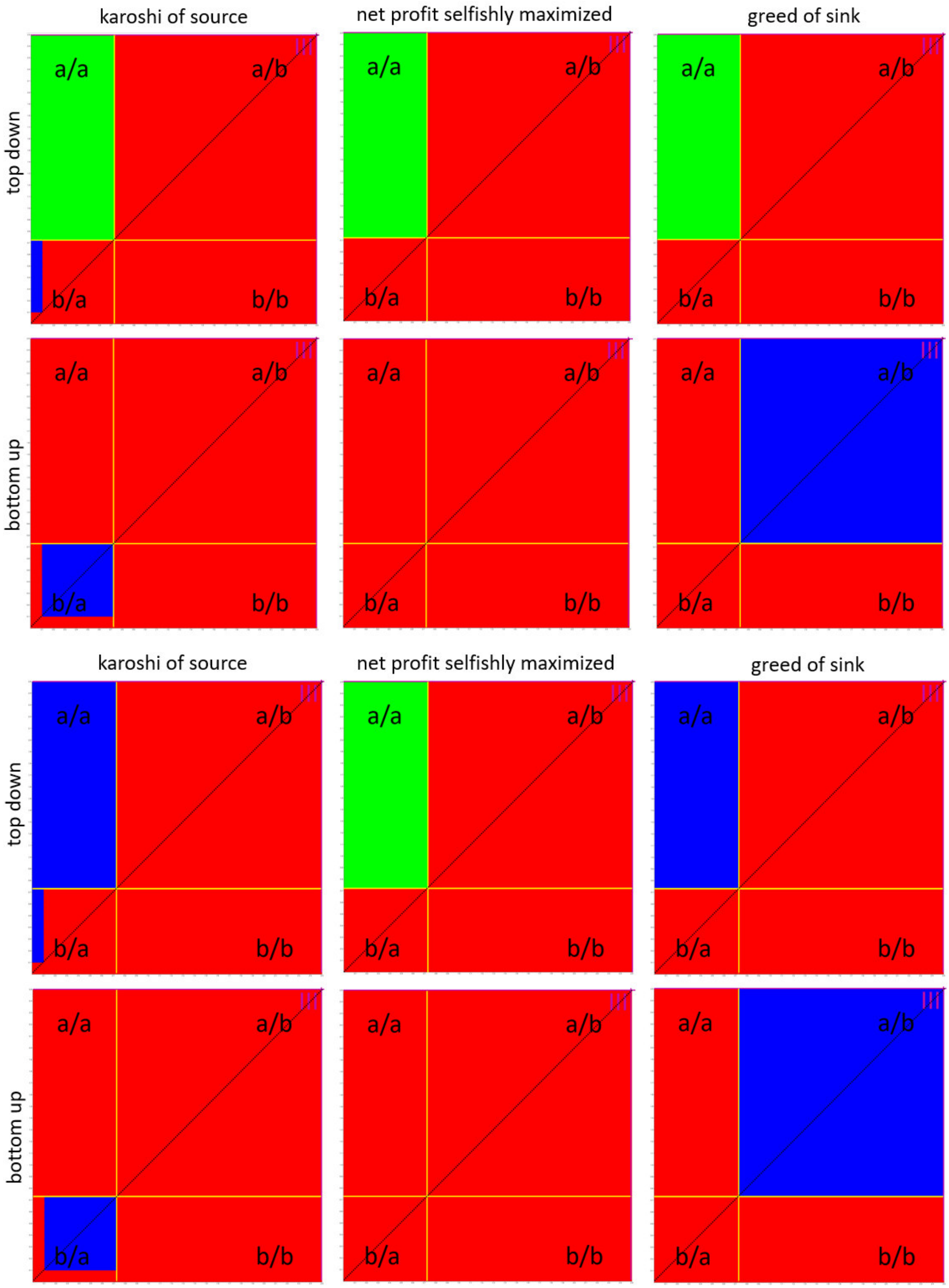


Figure 12

Here we observe symmetric ensembles within the positive net profit space. The left column always shows karoshi of source, the middle column always an ensemble where both sides selfishly maximize their own net profit and stay within their borders (np=max), and the right column depicts greed of sink. Green indicates an action by free will with respect to the outer motivation, blue an action by force or additional deception in the light of the outer motivation. The upper two rows show a conditional violent and additional deceptive master (top-down and bottom-up), the lower two rows show an unconditional violent and additional deceptive master (top-down and bottom-up). The upper limit of source is 2.5mM. In karoshi of source np=max (0.7247mM) is not respected on the source side. Source stops to give at 0.1mM. In greed of sink np=max (0.7247mM) is not respected. Sink stops at b=c (2.5mM). Further details see figure 6.

The qualitative results of the symmetric ensembles compare to the results of the weak asymmetric ensembles. In case of greed no infection of the superadditive subarea a/a is observable but subarea a/b is still completely subadditive. These results might be the cause that greed is considered one of the seven deadly sins in Christianity. Religions organize ensembles on large scales. Although they are no strangers to violence, they concentrate on deception. The goal is to optimize the output of the ensemble they control so that more is available for consumption by the masters. Several measures are to be considered. On one side religions increase the willingness to transfer. Transfers, as I demonstrate, are able to increase superadditivity in area I, II, and III. On the other side it is known from experience of mankind ("too much of a good thing") that there is an external end to all things. There must be a way to also stop behaviours that have been initiated and become harmful at higher intensity. Greed is such a behaviour. It is a behaviour that starts to be amoral when it becomes economically harming. Karoshi seems to have been recognized as a threat, too. Although the day of rest will be consumed by religious activities, physical labour is strictly forbidden. In modern societies greed is still morally rejected and overworking is regulated in many societies by law.

Karoshi and greed in the strong ensemble:

Figure 13

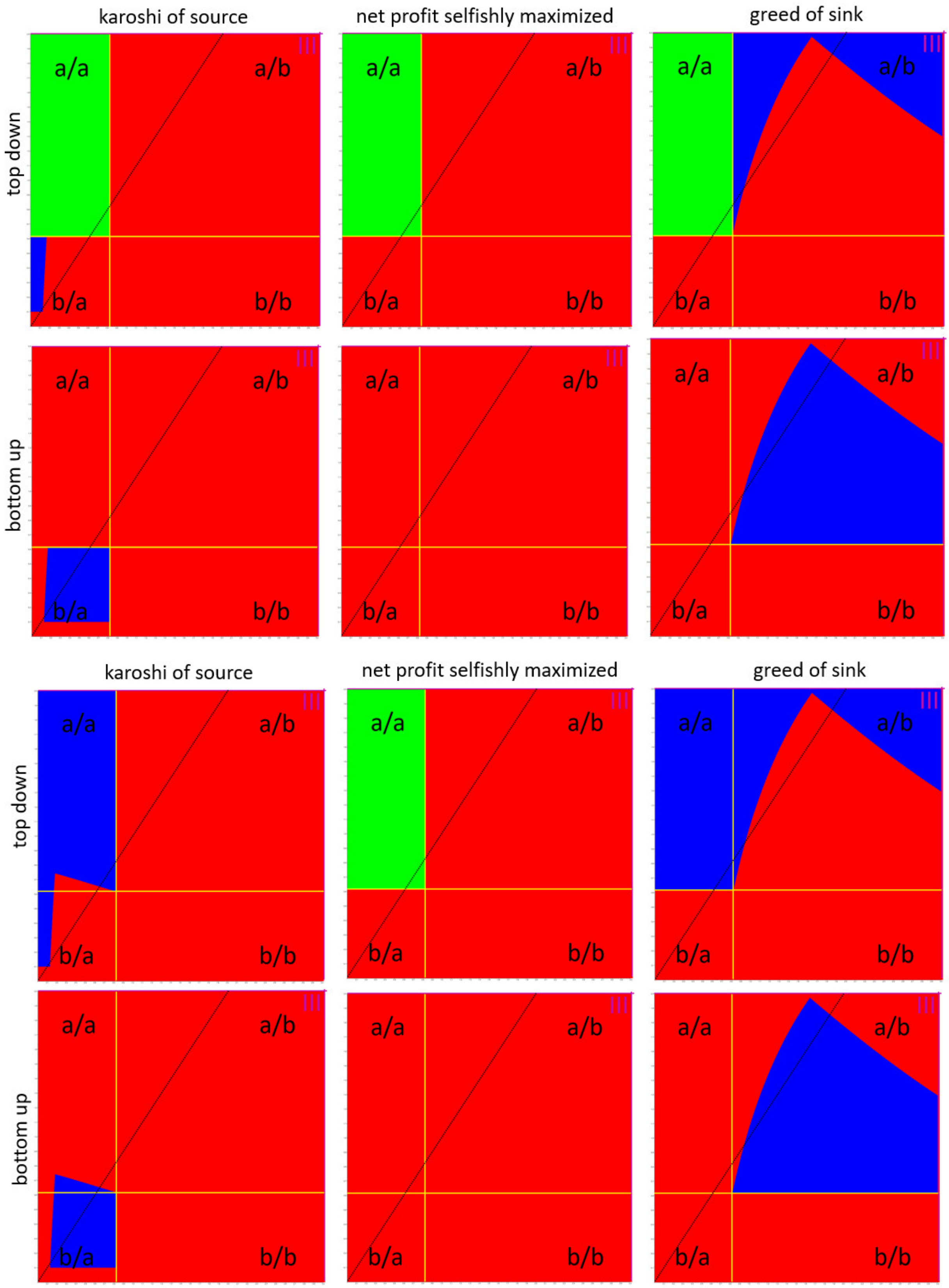


Figure 13

Here we observe strong asymmetric ensembles within the positive net profit space. The left column always shows karoshi of source, the middle column always an ensemble where both sides selfishly maximize their own net profit and stay within their borders (np=max), and the right column depicts greed of sink. Green indicates an action by free will with respect to the outer motivation, blue an action by force or additional deception in the light of the outer motivation. The upper two rows show a conditional violent and additional deceptive master (top-down and bottom-up), the lower two rows show an unconditional violent and additional deceptive master (top-down and bottom-up). The upper limit of source is 2mM. In karoshi of source np=max (0.8229mM) is not respected on the source side. Source stops to give at 0.1mM. In greed of sink np=max (0.618mM) is not respected. Sink stops at b=c (3mM). Further details see figure 6.

In the strong ensemble karoshi of source in the unconditional case has a surprizing result in store. Besides lots of subadditivity in subarea b/a there is an infection with subadditivity into area a/a observable. A further argument to control and avoid this behaviour by employee rights.

The result of greed is surprizing. There is still a lot of subadditivity but also some compensating superadditivity. Is that a case of “greed is good” (A quote from Gordon Gekko in the 1987 film Wall Street)?

In Biology the host-parasite relationship is well investigated. I want to compare the host with the source of substrate and the parasite with the sink of substrate. I do not compare humans with parasites! The ability of the host to withstand a parasite has two origins: resistance and tolerance. Resistance limits the parasitic load and tolerance limits the negative fitness effects (7). The confrontation of host and parasite is therefore on a short-term and on a long-term level. If the host saves investment into short-term resistance, he must be very tolerant towards the parasite. This strategy would avoid a costly arms race and subadditivity is ameliorated by superadditivity (greed of sink) in such a strong ensemble of host and parasite. A different, competing ensemble with an escalating arms race will miss out that superadditivity. Host and parasite are an ensemble, too.

Discussion

The transfer space and the net profit space in comparison

When we compare *e.g.* the symmetric ensemble within the transfer space and a symmetric ensemble within the positive net profit subspace, both with or without their respective master, we observe that the overall shape and distribution of superadditivity and subadditivity is very comparable (figures 6 - 10, table 1). This is no surprize as the positive net profit space is a subspace of the transfer space. Only the size of the transfers in both spaces is different while the underlying biochemistry is identical (bf, cf, Km, and Vmax). The two spaces do not behave very differently within their category as they are self-similar. However, there is an exception. The weak ensemble in area I of the transfer space and the weak ensemble of the positive net profit space differ.

In figure 14 I try to picture the basis of the similarity in a symmetric ensemble. Area I is an aera of free will controlled by the inner motivation. Transfers are superadditive. The same is true for an ensemble controlled by an outer motivation in area III within the limits of the maximal net profit for both parties. The subarea a/a is a part of a territory where only superadditivity is located in area III of the larger transfer space.

Subareas a/b and b/a resemble area II and area III as transitional areas, partly superadditive and partly subadditive. Finally, area IV is an irrational area with only subadditivity and is similar to subarea b/b. An irrational area too, as both parties decrease their respective net profit. Area b/b lies completely within the subadditive part of area III.

The overall shape, when we compare *e.g.* a conditional violent master of the transfer space with a conditional violent master of the positive net profit space, will therefore be similar. We compare a local situation mirroring the whole space with two identical masters. The difference is only in the detail.

Figure 14

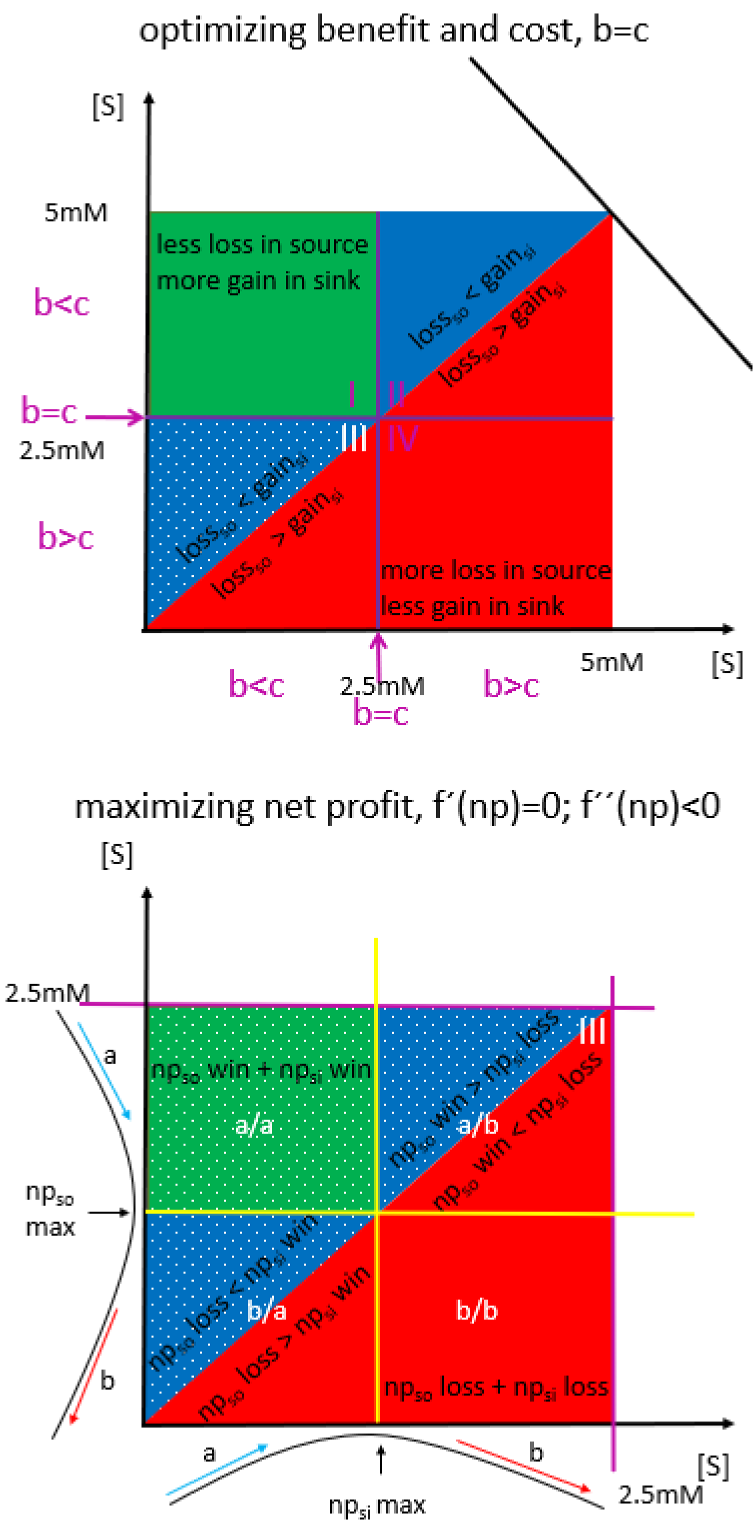


Figure 14

At the top the transfer space and at the bottom the positive net profit subspace is depicted. Here, the area a/a (green) is completely on the superadditive side of area III (blue). The white spots mark the region of superadditivity in area III of symmetric ensembles. The repetition of the pattern of the larger transfer space is the essence of self-similarity and results in a similar behaviour and outcome (table 1).

Karoshi and greed

The deep similarity between transfer space and net profit space is that both parties must watch their respective limit to avoid subadditivity. This limit is either b=c for both parties or np=max for both parties. If only one side is vigilant subadditivity as emergent cost might be a result.

To enter area III, where this investigation is focussing on, we have to force or deceive source to go beyond the limit b=c. Many of our non-scientific belief systems are an agent of deception. Other parts of social interactions are filled with the threat or application of force. However, it is unclear what the compensation factor between a priest or a philosopher and a policeman is. In other words, how many tough policemen are necessary to replace a wise priest. Once source is convinced of a new target (outer motivation, np=max), I then ask what happens if source goes beyond the new limit? We are already in an area where you should, according to your inner motivation, avoid to give (b>c). The result is severe harm to source and to the ensemble as a whole. If source does not observe its own selfish limit np=max (outer motivation) source will become exhausted. This behaviour seems to me comparable to “karoshi”. Death by overworking (8). The fact that there might be a fixed cost involved is complicating the interpretation a little. When a fixed cost is involved, source gives at low concentrations within the limits of the fixed cost at free will (inner motivation, c_{fix}>b, 4); but it is also the fault of sink; sink takes (b>c).

A very unsettling observation in this context is the fact that the holding line np=max of source is passing through the irrational area IV. This could be interpreted as the limit of slave labour. Maximal net profit is created for the source of the labour. However, sink and superadditivity of the ensemble are harmed. Again: area IV is an irrational area according to the inner motivation! If source would even go beyond its own outer motivation (np=max) we might enter a territory where inner and outer motivation are harmed in both parties; source is depleted and sink is overburdened according to inner and outer motivation. The point at which irrationality may turn into evil revenge; eye to eye.

On the other side, when sink is surpassing its limit np=max, we observe greed (9). Greed is defined as intense and selfish desire for something, especially wealth, power, or food. This is also harming the ensemble and creates subadditivity. But sink is still in accordance with its inner motivation (b=c) and might stop at least then.

Greed and karoshi are harmful, but this harm is limited to the acting party and the ensemble. A third-party master could force source and sink even into subarea b/b (figure 8), harming both and further increase the amount of subadditivity because subarea a/a is infected.

A comparison of area II and aera III of the transfer space

Area II was not the focus of this investigation. I assume that a public good is created in area II while source and sink negotiate who has to carry more burden in the absence of a positive net profit. Area II could be renamed as the subspace of the “hot potato”. Source as internal master tries to reach its limit b=c (still cost dominated) and sink tries to avoid to be pushed too far into the region where b<c for sink (becoming more cost dominated). Or the external master forces and deceives sink to submit to the demand of source. This area also earns a detailed analysis as I am convinced that a lot of economic activity of societies including public services are located here in area II while the economic activity of the private sector is located in area III. In contrast to area III, area II has no maximum in net profit nor any other easy to detect inner limit. Both parties have a negative net profit. A transfer of a burden (both parties are cost dominated) by force and

deception to sink will lead to superadditivity for the ensemble. The negative net profit in source will be much less negative and the negative net profit in sink will become a little more negative. A forced transfer creates superadditivity for the ensemble out of negative net profits. But in some cases, superadditivity will turn into subadditivity beyond the line of mixing.

If area II is the subspace of public services, it becomes clear that it is not possible to privatize activities in area II. Privatisation always includes that a positive net profit has to be a result. However, in area II maximal profit for either side is unachievable (all figures of the transfer space)! In case you privatize a water company or the whole railway sytem you must not wonder if the service is deteriorating and the assets are run down to extract money by financing dividends with debt. In this area net profit is no longer a good measure. In addition and on top, when a master is paid according to the transfer size (*e.g.* he determines the size of the dividends for the shareholders) and not according to the size of a net profit, he will not find an end to the size and duration of the transfer, as I previously demonstrated (4, 6). Area II is the home of such masters due to the lack of limits. There they thrive uncontrolled. Now we can understand an observation that tends to be made with public services in general. As there is no internal limit within area II like b=c of the transfer space or np=max of the positive net profit space, it is impossible for the ensemble to find a breakpoint and, in addition, a master may have wrong incentives. Therefore, public services tend to grow limitless until so much subadditivity is accumulated beyond the line of mixing in symmetric ensembles, that the whole ensemble collapses. The subadditivity in area II and area III is an emergent cost. Only in area III the single parties observing the outer motivation to maximize positive net profit are able to avoid this emergent cost (figure 6, positive net profit space).

Although area II and area III are part of the same space with the same law, you can´t repeat the success story of area III in area II. On the other side, if area III is used to produce a maxed out positive net profit simultaneously in source and sink, area III will no longer produce any superadditivity after a transfer. As area III is the location where positive net profit is produced on cost of superadditivity, it could finance area II via taxes and produce superadditivity there. But, as taxation comes from a public service institution, there will be no end to the growth of taxation. In addition, those masters are paid according to the transfer size *i.e.* the size of the department, its budget and the number of subordinates.

The secret of net profit orientation via a strongly internalized outer motivation to maximize net profit results in the ability to find two new holding lines beyond b=c for source or sink. It is absolutely imaginable (and has happened) to induce a convincing outer motivation in area II to maximize superadditivity. However, there are no new holding lines for both parties. The single party, a two-dimensional entity, can´t detect superadditivity of the ensemble, a three-dimensional entity. The single party needs something the single party can detect like b=c or np=max. The holding line for area II must come from area III. When net profit production there is exhausted, transfers into area II have to stop. But it is necessary to stop before the system moves beyond the mixing line in symmetric ensembles and starts to produce subadditivity.

The determination of superadditivity in my model is possible as benefit and cost share the same dimensionality (*e.g.* €). The individual party's benchmark (np=max) as well as superadditivity and subadditivity are comparable and can be derived from each other. Here, the single party could measure and understand the outcome of the higher dimensional entity. However, this changes when benefit and cost have no longer the same basic units. If it is not possible to value superadditivity and subadditivity on *e.g.* €, an interpretation of the outcome of the ensemble becomes difficult. There may be a conversion factor between € and "well-being" but those factors, their size and sign, will be a target of political interpretations and manipulations.

The transfer space is a model of efficiency in two connected parties

The transfer space centres around better efficiency. Better efficiency is either achieved *in situ* or by transfer. There is no magic improvement beyond the maximal possible efficiency. The increase or decrease in productivity (superadditivity or subadditivity) is a result of non-linearity. The transfer relocates the substrate to a better (superadditivity as result) or worse (subadditivity as result) location with respect to productivity. The conservation laws are obeyed.

That is an interpretation of my model; a biochemical model. Is it an exaggeration to go from a biochemical model with simple functions and a very simple ensemble to conclusions and interpretations of ensembles of a much higher complexity? I do not care as this will be observable everywhere where linear cost functions and saturating benefit functions are involved. But basically, even the shape of the functions does not matter (non-linearity is a must). Benefit and cost function have to share a point where b=c. On one side benefit domination should be observable and on the other side cost domination. The limits of maximal net profit will emerge from there.

The use of the expression "force and deception"

In the past I used the expression "force and deception" to explain activity outside of area I. In the light of the observations in my new investigation this seems no longer to be a generally applicable combination. If deception is not successful, the ensemble will not be active; force has to be used. Undetected deception will activate the ensemble. The ensemble has now an outer motivation and will act accordingly. A possible outer motivation is the idea to maximize the individual net profit. This kind of deception is special as it creates limited harm. Other deceptions, ideologies, doctrines, and religions, are less sensitive. Though they try to avoid the use of harming brute force via a deeply engrained outer motivation, they do not follow both inner limits and therefore create lots of subadditivity beyond the line of equal concentration in symmetric ensembles.

On the other hand, there is less conflict in belief systems - except with reality. If source and sink try to maximize their respective net profit, they usually are not able to reach this goal simultaneously; conflicts are a result. There is only one line of transfers in source and sink to reach the maximal net profit in source and sink at the same moment. This is similar to the line of perfect harmony (perfect symbiosis) in the transfer space (source and sink both reach b=c). Conflicts arise when the party who has not reached its goal tries to accomplish this. This is identical in the transfer space and the positive net profit space. As soon as areas II and III or a/b and b/a will be entered, subadditivity as emergent cost could be a result.

Envy and contempt

The quality of a model becomes visible when different and complex aspects of the real world are explained within the model without any modification of the model. Envy and contempt are emotions that coexist and interact, creating a complex emotional landscape. When ensembles compare one another but differ in their outcome due to differences in their underlying functions, for whatever reason, they may develop feelings of envy and contempt (Figure 15) unaware of the underlying differences.

Figure 15

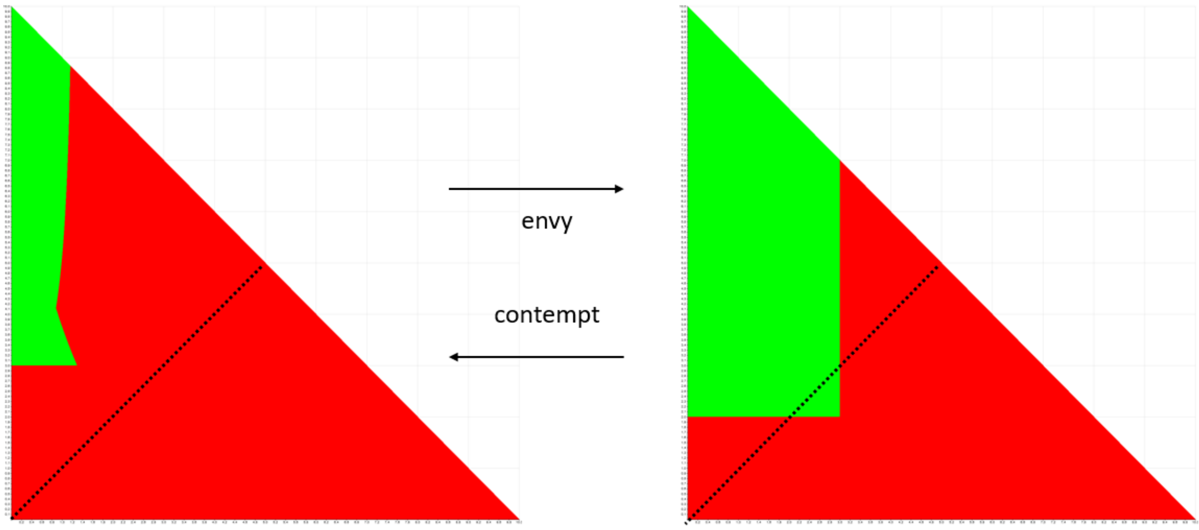


Figure 15

On the left a weak ensemble is depicted (top down) and on the right a strong ensemble is depicted (top down); compare figure 6. The concentration range is the same but all limits and functions are unknown to the ensembles and their masters and therefore the different outcome can´t be understood or explained. The only orientation is the line of equal concentrations (black dotted).

I do not intend to explain or justify differences in the outcome of ensembles. I just want to demonstrate the explanatory power of my model. Societies are complex arrangements of ensembles of ensembles of ensembles (*ad infinitum*, 10). The ensemble of the highest order is in competition with other ensembles of similar complexity. The best outcome is only possible if all lower ensembles are performing optimal. Envy and contempt will act negatively on top of other unresolved hindrances as they disturb social cohesion.

On the other side, the incitement of envy from the outside is a possibility to reduce the performance and interplay of the parts of a complex competing ensemble. The same strategy might be used from the inside by masters who are evaluated according to the size of the transfer, not the outcome. An equal adjustment of concentration is a simple strategy used by them to mitigate the different outcome. But this will not help if the underlying functions are not changed; a permanent task and professional position is born. Transfers in a weak ensemble will continue to lead to subadditivity. Mixing or even larger transfers only exacerbate the problem.

Single organisms are also complex, multilayered ensembles of ensembles. Here, mutation and selection have already adjusted the system in a long-lasting evolutionary process.

Literature

1. Friedrich, T and Köpper, W (2013) Schumpeter´s Gale: Mixing and compartmentalization in Economics and Biology. MPRA_paper_45405
2. Solow, RM (1956) A Contribution to the Theory of Economic Growth. Quarterly Journal of Economics. 70, pp 65–94 (doi:10.2307/1884513).
3. Swan TW (1956) Economic Growth and Capital Accumulation. Economic Record 32(2) 334-361 (doi.org/10.1111/j.1475-4932.1956.tb00434.x)
4. Friedrich, T (2023) A positive net profit strategy and a pure substrate transfer strategy are both necessary for an ensemble to succeed in the presence of a fixed cost. MPRA_paper_117108
5. Friedrich, T (2015) The limits of wise exploitation in dependent and independent symmetric ensembles. MPRA_paper_68250
6. Friedrich, T (2019) Transfers by force and deception lead to stability in an evolutionary learning process when controlled by net profit but not by turnover. MPRA_paper_97806
7. Kutzer MA, Armitage SA. (1997) Maximising fitness in the face of parasites: a review of host tolerance. Zoology (Jena). 2016 Aug;119(4):281-9. doi: 10.1016/j.zool.2016.05.011. Epub 2016 May 27. PMID: 27373338.
8. Nishiyama, K and Johnson JV (1997) Karoshi—Death from Overwork: Occupational Health Consequences of Japanese Production Management. International Journal of Health Services. https://doi.org/10.2190/1JPC-679V-DYNT-HJ6G
9. Zeelenberg M and Breugelmans SM (2022) The good, bad and ugly of dispositional greed. Current Opinion in Psychology https://doi.org/10.1016/j.copsyc.2022.101323
10. Friedrich T (2018) Evolution towards higher net profit in a population of ensembles of ensembles leads to division of labour. MPRA_paper_97796