**Power**

The concept of ‘power’ is widely used in sociology but its nature is more than usually disputed. (A good, brief summary is found in Uphoff (1989) ‘Distinguishing Power, Authority & Legitimacy’, *Polity*, 22.2:295-322.) Blalock and Wilken ((1979), Intergroup Processes, NY: Free Press, p. 330) note that there are at least two conceptions of social power that are in play in sociological theorizing. The first conception concerns the actual achievement of goals and may apply more readily to HLSTs; the second conception is at the micro level and is appropriate to interpersonal conceptions of social power. Since our working assumption is that at some stage the macro level analyses will need to be *in principle* explicable in terms of (if not actually reducible to) micro level phenomena, and that the attempt to begin at the top level is legitimate but can *only* proceed in a correlational fashion until the micro level analysis has proposed a range of adequate theoretical constraints upon macro level speculations, we therefore confine our interest to the second form of conception of social power.

Power is discussed using a variety of terms such as ‘power,’ ‘authority,’ or ‘dominance’: they are, moreover, used in a vast number of ways in the literature – most of them poorly defined. Amongst the commonly acknowledged definitions those of Weber are often taken to be canonical, so that other definitions or conceptions are proposed or defended with respect to the Weberian usage. (Other definitions or usages claim to be Weberian but cannot be made consistent with Weber’s writings.) Weber defines power very generally, thus:

Power [*Macht*] is the probability that one actor within a social relationship will be in a position to carry out his own will despite resistance, regardless of the basis on which this probability rests. (Weber (1947) (trs: Henderson and Parsons) *The Theory of Social and Economic Organization*, New York: Oxford University Press, 1947 p. 152)

It is a standard observation, however, that power – particularly when considered as ultimately explicable in micro level terms – is best considered as a relationship between two or more actors. Weber’s definition rather suggests that power should be considered as an entity itself, or at best a property or quality of an agent or group of agents; but if power is properly a characterisation of a relationship, then the use of the term to describe a property or quality of an agent can only be a derivative usage. The preference for the relationship interpretation of power suggests a rephrasing of Weber’s definition that makes that interpretation a more natural one; thus:

*x* has Power [*Macht*] over *y* when the social relationship between *x* and *y* is such that *x* is in a position that it is probable that *x* will carry out his own will despite the resistance of *y*, regardless of the basis on which this probability rests.

***Action and Context***

It then becomes necessary to clarify what exactly is meant by ‘carrying out one’s own will:’ does it mean ‘performing an action that one desires’ or ‘achieving a result that one desires’ or does it mean something else again? We could distinguish these two interpretations and attempt a formalisation using the established notation, as follows:

*x* has (Action) Power over *y* iff *ax*  *Ex*[ *x* ] *Ey*[ *x* ] which satisfies the conditions

» *There is an action by x which both x and y believe possible, and*

1. *Dx*[*Ax = ax* ]  *Prob*(*Ax = ax*) > *Prob*(*Ax*  *ax*)

» *if x wants to do it then it is more likely than not that x will do it, and*

1. ~(*Dy*[*Ax*  *ax* ]  ~(*Prob*(*Ax = ax*) > *Prob*(*Ax*  *ax*)))

» *it isn’t the case that if y doesn’t want x to do it then it is more likely than not that x will not do it.*

*Briefly: x will likely do what it wants and y’s desires won’t change that.*

*x* has (Context) Power over *y* iff *cx*  *Ex*[ *x* ]  *Ey*[ *x* ] and

» *There is a context for x which both x and y believe possible, and*

for *x’* = {*ax*  *x*: *C*(*ax*, *cx,0*) = *c*x}, *Ex*[*x’* ]  *, and*

» *there are actions x believes it can take to achieve that context, and*

1. *Dx*[ *i*)[*cx,i = cx*] ]  *Prob*(*ax*  *Ex*[*x’* ]) [*Ax* = *ax*])

> *Prob*(~*ax*  *Ex*[*x’* ]) [*Ax* = *ax*])

» *if x wants to be in that context eventually then it is more likely than not that x will so act, and*

1. ~(*Dy*[ *i*)[*cx,i*  *cx*] ]  ~( *Prob*(*ax*  *Ex*[*x’* ]) [*Ax* = *ax*])

> *Prob*(~*ax*  *Ex*[*x’* ]) [*Ax* = *ax*]))

» *it isn’t the case that if* *y doesn’t want x to be in that context eventually then it is more likely than not that x will not so act.*

*Briefly: x will act if it can to bring about a preferred context and y’s desires won’t change that.*

* Note: for convenience here and in what follows we have usually omitted the quality and context parameters for *Ax*(*qx*, *cx*).
* Degrees of power can be explained by reference to the probability functions in the conditions.
* As presented the relationship of power appears to have little essential structure. It is not necessarily transitive, and it is not necessarily non-symmetric.

However, if defined in those ways the concept of Power would probably still be too general to be of much use. Nor do they really capture the essence of what it is that we have in mind when we talk of social power, which seems rather to be something like the idea that person A has power over person B if A is able to direct the actions of B according to the will of A and largely regardless of what B would will if A had not so willed. The evidence for this latter claim is that Weber provided a more specific concept which has been much more widely utilised (and often enough confused with his basic notion of ‘power,’) which made something like that claim. This more specific concept is his notion of *Herrschaft*, a term which has been translated as ‘authority’ or ‘domination.’ As he defines it, this is:

the probability that certain specific commands (or all commands) will be obeyed by a given group of persons. (Weber, M., *Economy and Society: An Outline of Interpretive Sociology*, New York: Bedminster Press, 1968 p. 212.)

To which must be added the qualification it inherits from its parent concept of ‘Power,’ that the probability of such obedience is “despite resistance, regardless of the basis on which this probability rests.” We would also rephrase this to avoid suggesting an entity interpretation of power; thus:

*x* has Authority over *y* when the social relationship between *x* and *y* is such that *x* is in a position that it is probable that *y* will obey the commands of *x* despite the resistance of *y*, regardless of the basis on which this probability rests.

Further refinements of the notion made by Weber and adopted by others as constitutive include a range of theoretical commitments – to obedience being voluntary, to obedience being a pursuit of interest, to the acceptance of the legitimacy of the dominance relation, and to the persistence of the dominance relationship. These commitments are clearly important to the sociological function of this concept for certain sociologists, but they must not be adopted by default. They need to be added as required to the core commitments of the concept on which the community can agree.

***Dominance***

Assuming, then, that something of the nature proposed is what is required in a definition of social power, and interpreting it as a relationship rather than an entity; one might attempt a general definition of domination as requiring that:

*ay*  *Ex*[ *y* ] *Ey*[ *y* ] satisfying the conditions

» *There is an action by y which both x and y believe possible, and*

1. *Dx*[*Ay = ay* ]  *Prob*(*Ay = ay*) > *Prob*(*Ay*  *ay*)

» *if x wants y to do it then it is more likely than not that x will do it, and*

1. ~(*Dy*[*Ay*  *ay* ]  ~(*Prob*(*Ay = ay*) > *Prob*(*Ay*  *ay*)))

» *it isn’t the case that if y doesn’t want to do it then it is more likely than not that y will not do it.*

*Briefly: y will likely do what x wants and y’s desires won’t change that.*

But this again appears inadequate, since it does not properly capture the notion of power as distinct from mere advantage or privilege. The essential agency of *x* in the power relationship is not expressed. The following attempted definition will account for this; thus we shall say that:

*x* Dominates *y* iff *ay,i*  *Ex*[ *y,i* ] *Ey*[ *y,i* ] which satisfies the conditions

» *There is an action by y which both x and y believe possible, and*

1. *Dx*[*Ay,i=ay,i* ]  ((*j<i*)(*ax,j**Ex*[ *x,j* ])[*Ax,j=ax,j*  *Prob*(*Ay,i=ay,i*) > *Prob*(*Ay,i**ay,i*)])

» *if x wants y to do it then there is some other prior action x believes it can take so that it is more likely than not that y will do what x wants, and*

1. ~(*Dy*[*Ay,i**ay,i*] ((*j<i*)(*ay,j**Ey*[ *y,j* ])[*Ay,j=ay,j*(*Prob*(*Ay,i=ay,i*)>*Prob*(*Ay,i**ay,i*))])

» *it isn’t the case that if y doesn’t want to do it then there is some other prior action y believes it can take so that it is more likely than not that y will not do what x wants.*

*Briefly: x has actions it can take to make y likely to do what x wants and y’s desires and actions won’t change that.*

* Write *x*>*y*
* Note that dominance is a relationship of potential action. *X* is dominant over *y* if it is the case that *if* *x* desires some outcome then there is an action it can take which makes that outcome likely to occur.
* Degrees of dominance can be explained by reference to the probability functions in the conditions.
* Further refinements of the definition could ensure that the actions *x* may take to make the outcome likely will actually *improve* the chances of that outcome – although that seems unnecessary, and may require excessive epistemological competence on the part of the actors.
* The second condition expresses the fact that resistance by *y* is ineffectual, but is essentially a consequence of the first condition. (The converse is not true.)

A Dominance Relationship (DR) is a binary relationship, **, defined on agents such that:

*xy*  *x*>*y*

* A DR may not be *primarily* a dominance relationship. Whether it is labelled as such depends upon the intention of the author.

Dominance *per se* appears to have little essential structure. It is not necessarily transitive, and it is not necessarily non-symmetric. We will, however, have reason to speak of particular dominance relationships (DR) which are transitive or non-symmetric. Therefore we make the following definitions:

** is a Transitive Dominance Relationship (TDR) between agents if

1. *xy*  *x*>*y*
2. *xy* & *y**z* *xz*

Let ** be a TDR. We say that there is a Dominance Sequence subordinating agent *y* to agent *x* iff

(*xi*: *i*=1, …,*n*>) [*xx1* & *x1x2* & … & *xny*],

* write *x*>>*y* and read that as *x* Distantly Dominates *y*.
* When *x*>*y* as in the previous definition we may say that *x* Proximately Dominates *y*.

Although for convenience we had omitted the quality and context parameters for *Ax*(*qx*, *cx*) in the definitions of the dominance relationship, in fact most cases of dominance depend upon the circumstances of the agents, and these circumstances are changeable. To make this point clear we may restate the dominance conditions as:

*ay,i*  *Ex*[ *y,i* ] *Ey*[ *y,i* ])(*cy,i* *y*)

1. *Dx*[*Ay*(*qy,i*, *cy,i*) *= ay,i* ] 

((*j<i*)(*ax,j*  *Ex*[ *x,j* ])[*Ax*(*qx,j*, *cx,j*) *= ax,j* 

*Prob*(*Ay*(*qy,i*, *cy,i*) *= ay,i*) > *Prob*(*Ay*(*qy,i*, *cy,i*) *ay,i*)])

1. ~(*Dy*[*Ay*(*qy,i*, *cy,i*) *ay,i* ] 

((*j<i*)(*ay,j*  *Ey*[ *y,j* ])[*Ay*(*qy,j*, *cy,j*) *= ay,j* 

~(*Prob*(*Ay*(*qy,i*, *cy,i*) *= ay,i*) > *Prob*(*Ay*(*qy,i*, *cy,i*) *ay,i*))])

In which *cy,i**y* is the context of *y* at the index *i*. If we wish to make this explicit in the notation for the DR, we may write *cy,i*, meaning that *x* dominates *y* in *cy,i*. Although it is likely that for any *x* and *y*, no matter what the present or likely contexts may be, there are logically possible alternative contexts in which *x* dominates *y*, we may wish to consider certain classes of dominance relation for which the variability of the dominance relation is more than merely logically possible. There are various ways available to us to describe the variability of the relationship. What follows are two approaches to this variability; other approaches may be adopted as the theoretical need arises.

Let ** be a DR for which *x**y*. ** is Contextually Varying if

(*cy**y*)

1. *Prob*((*i*)[*cy,i* = *cy*]) >> 0
2. ~(*x**cyy*)

» *There are likely contexts for which x does not contextually dominate y.*

* If a DR is not contextually varying, then describe it as Contextually Unvarying.

Let ** be a DR for which *x**y*. Define the Contexts of Effect for ** as

** = {*cy**y*: *x*>cyy}

We can also define dominance relationships amongst *sets* of agents as follows:

Let *X*, *Y* be disjoint sets of agents. *X* Dominates *Y* iff

(*y*  *Y*) (*x*  *X*) [*x* > *y*].

The notions of proximate and distant dominance apply in the set context with the obvious definitions.

***Constraint***

Another example of the kind of definition that is proposed to cover the preferred conception of social power is given by Blalock and Wilken who offer the following: “A has power over B when A can change B’s actions, or sanction B, and so forth.” The relationship to Weber’s definition is notable, but this ‘definition’ is only offered as an *indicator* by those authors, and it is, of course, unsatisfactory as it stands. For example, it does not distinguish between power and mere influence. On the other hand, their definition, in making mention of sanctions that A might apply to B, recognises the need to concern ourselves with certain broad classes of mechanism by which the actions of B are brought into accord with the will of A. To distinguish this form of power from ‘power’ as the mere existence of the effect of one agent on another, we would need to make explicit its reliance upon the coercive capabilities of A over B. Thus we would need to express the fact that B changes his behaviours because he believes that A *has the ability* to punish him if he fails to comply. Moreover, B believes that A actually *will* punish him if he fails to comply. This we may term the ‘constraint’ that A places upon B.

We can attempt a definition using the established formalism as follows:

*x* constrains *y* iff *aresponse*  *Ey*[ *x* ] which satisfies the conditions

» *There is a response by x which y believes possible, and*

1. *Ey*[ *C*(*aresponse*, *cy,0*) ] = *cresponse*

» *y thinks the result of that response would be a certain context for y for which*

1. *Ey*[ *T*(*cresponse*, *Iy*) ] << *Ey*[ *T*(*cnow*, *Iy*) ]

» *y thinks its total satisfaction would be much less than it is now, and*

1. *a*  *Ey*[ *y* ]) [*By*[ *Ay*=*a*  *Ax*=*aresponse* ] & *By*[ (*Ay**a*  *Ax**aresponse*) ]]

» *for some actions y thinks possible, y believes doing them would elicit the response by x and not doing them would prevent it*

* Whenever *x* and *y* are in a relationship like this we say that *x* Constrains *y* and write *x*/*y*
* *x*/*y*  *x>y*, which is to say that constraint is a special kind of dominance relation, and we say that *x* Dominates *y* by Constraint.
* As presented the relationship of constraint appears to have little essential structure. It is not necessarily transitive, and it is not necessarily non-symmetric.
* Degrees of constraint can be traced back to the degrees by which the total satisfaction functions are altered in 2.
* Complexity can be added by noting that in most cases *aresponse* is merely one of a class of behaviours that are available to *x* which can punish *y* in various degrees, that *a* in condition 3 is merely one of a class of behaviours that are available to *y* which can prompt the response from *x*.
* *cnow* in condition 2 is the context at the time of consideration, but it should really refer to the context that exists when *x* does not respond punitively to the *b* in condition 3.
* Note that this is constraint operates by sanction or punishment, but there is a similar definition available for power through reward: simply replace condition 2 with the condition

*Ey*[ *T*(*cresponse*, *Iy*) ] >> *Ey*[ *T*(*cnow*, *Iy*) ]

In the light of the notes above, refine the original definition thus:

*x* constrains *y* iff

(*x,response*  *Ey*[ *x* ])

» *There is a set of responses by x which y believes possible, and*

(*x,neutral*  *Ey*[ *x* ] – *x,response*)

» *there is a disjoint set of neutral reactions by x which y believes possible, and*

(*y,challenge*  *Ey*[ *y* ])

» *there is a set of challenges by y which y believes possible, and*

the following conditions are satisfied:

1. (*aresponse*  *x,response*) *Ey*[ *Prob*(*x,neutral* | *Ax**aresponse* )]  1

» *y thinks the likelihood of a neutral reaction from x whenever x doesn’t respond is great, but*

1. (*achallenge*  *y,challenge*) (*aresponse*  *x,response*) *By*[ *Ay*=*achallenge*  *Ax*=*aresponse* ]

» *y thinks any challenge by y will bring a response from x, and*

1. (*aresponse*  *x,response*) (*achallenge*  *y,challenge*) *By*[ *Ax*=*aresponse*  *Ay*=*achallenge* ]

» *y thinks that x will respond only if y challenges, and*

1. (*cresponse*  *Ey*[ *C*(*x,response*, *cy,i*) ]) (*cneutral*  *Ey*[ *C*(*x,neutral*, *cy,i*) ])

*Ey*[ *T*(*cresponse*, *Iy*) ] << *Ey*[ *T*(*cneutral*, *Iy*) ]

» *y thinks its total satisfaction in the context resulting from x’s response would be much less than in the context resulting from x’s neutral reaction.*

* *cy,i* in (4.) is the context of *y* at index *i*, taken to be the time at which *y* considers action
* We can also create a similar definition of constraint acting through rewards rather than punishments. To do so we simply replace part 4 of the above condition with

(*cresponse*  *Ey*[ *C*(*x,response*, *cy,i*) ]) (*cneutral*  *Ey*[ *C*(*x,neutral*, *cy,i*) ])

*Ey*[ *T*(*cresponse*, *Iy*) ] >> *Ey*[ *T*(*cneutral*, *Iy*) ]

» *y thinks its total satisfaction in the context resulting from x’s response would be much greater than in the context resulting from x’s neutral reaction.*

* To distinguish the two forms of constraint we describe them as Negative and Positive Constraints respectively, and write *x*+/*y* to mean *x* positively constrains *y* and *x*-/*y* to mean *x* negatively constrains *y*. It’s possible, of course, for x to constrain y both negatively *and* positively. Where we are not interested in the particular kind of constraint, we shall continue to use the notation *x*/*y*.
* In part 4 of the above condition we use the relation << to indicate that the difference is ‘very large.’ No more specificity can be expected in the definition of such a relationship – the point at which actions are ‘forced’ upon one by another may depend upon such imponderables as the strength of will of the various characters. When the difference exists but is ‘not so large’ we might be inclined to write < and to speak of negative and positive influences rather than constraints.

A Constraint Relationship (CR) is a binary relationship, **, defined on agents such that:

*xy*  *x*/*y*

We can adapt much of what was said above for dominance relationships to the special case of constraint relationships

** is a Transitive Constraint Relationship (TCR) between agents if

1. *xy*  *x*/*y*
2. *xy* & *yz* *x**z*

Let ** be a TCR. We say that there is a Constraint Sequence subordinating agent *y* to agent *x* iff

(*xi*: *i*=1, …,*n*>) [*xx1* & *x1x2* & … & *xny*]

* write *x*//*y* and read that as *x* Distantly Constrains *y*.
* When *x*/*y* as in the previous definition we may say that *x* Proximately Constrains *y*.

Noting that most cases of constraint depend upon the circumstances of the agents (*cy,i* in (4.) in the definition above), and that these circumstances are changeable, we may wish to consider certain classes of constraint relation for which contextual variability is more than merely logically possible. To emphasise that the relationship of constraint, **, applies in the context *cy,i*, we write *cy*,i.The two approaches we adopted for the case of dominance in general may be adapted thus:

Let ** be a CR for which *xcyy*. ** is Contextually Varying if

(*cy**y*)

1. *Prob*((*i*)[*cy,i* = *cy*]) >> 0
2. ~(*x**cyy*)

» *There are likely contexts for which x does not contextually constrain y.*

* If a CR is not contextually varying, then describe it as Contextually Unvarying.

Let ** be a CR for which *x**y*. Define the Contexts of Effect for ** as

** = {*cy**y*: *x*/cy*y*}

We can also define constraint relationships amongst *sets* of agents as follows:

Let *X*, *Y* be disjoint sets of agents. *X* Constrains *Y* iff

(*y*  *Y*) (*x*  *X*) [*x* / *y*].

The notions of proximate and distant constraint apply in the set context with the obvious definitions.

***Normative Effects***

Special cases of dominance are created by some norm formations. The circumstance in which a norm formation *N* is said to impose a relation of Normative Dominance on *x*, *y* elements of *K*(*N*), the acceptants of *N*, is as follows:

*x* normatively dominates *y* in *N* iff *x*, *y*  *K*(*N*) &

*ay*  *Ex*[ *y* ] *Ey*[ *y* ]

1. *x*, *y*  *K*(*N*) 
(*Dx*[*Ay,i=ay,i* ]  ((*j<i*)(*ax,j*  *Ex*[ *x,j* ])[*Ax,j=ax,j*  *Prob*(*Ay,i=ay,i*) > *Prob*(*Ay,i**ay,i*)]))
2. *x*, *y*  *K*(*N*) 
~(*Dy*[*Ay,i**ay,i* ]  ((*j<i*)(*ay,j*  *Ey*[ *y,j* ])[*Ay,j=ay,j*  ~(*Prob*(*Ay,i=ay,i*) > *Prob*(*Ay,i**ay,i*))])
* Write *x*>*Ny*
* A considerable amount of confusion has attended the distinctions that Weber may or may not have made between legitimate and illegitimate forms of power, or those whose legitimacy is or is not accepted. Roughly speaking, a system of dominance which is legitimate is one in which the actors accept that they are bound by the norms that define the system of dominance relations. Thus Weber’s category of ‘legitimate authority’ is effectively identical to the ‘normative dominance’ described here.

The obvious comments and definitions apply for normative dominance in the set case, as do the definitions of dominance sequences and of distant and proximate dominance.

The circumstance in which the norm formation *N* imposes a relation of Normative Constraint on *x*, *y* elements of *K*(*N*), the acceptants of *N*, is as follows:

*x* normatively constrains *y* in *N* iff *x*, *y*  *K*(*N*) &

(*x,response*  *Ey*[ *x* ])

(*x,neutral*  *Ey*[ *x* ] – *x,response*)

(*y,challenge*  *Ey*[ *y* ])

the following conditions are satisfied:

1. (*aresponse*  *x,response*) *Ey*[ *P*(*x,neutral* | *Ax**aresponse* ]  1
2. (*achallenge*  *y,challenge*) (*aresponse*  *x,response*) (*N’*  *N*)

[(*Ey*[ *N’* (*Ay*=*achallenge* *Ax*=*aresponse* )]]

» *…* *y thinks any challenge by y will bring a response from x according to accepted norms, and*

1. (*aresponse*  *x,response*)) (*achallenge*  *y,challenge*) (*N’*  *N*)

[(*Ey*[ (*Ax*=*aresponse*  *Ay*=*achallenge*)  *N’*]

» *y thinks that x will respond only if y challenges only if accepted norms are in play, and …*

1. (*cresponse*  *Ey*[ *C*(*x,response*, *cy,i*) ]) (*cneutral*  *Ey*[ *C*(*x,neutral*, *cy,i*) ])

*Ey*[ *T*(*cresponse*, *Iy*) ] << *Ey*[ *T*(*cneutral*, *Iy*) ]

* Note: for convenience we again omit the parametrization of *Ax*.
* This condition differs from the condition for (non-normative) constraint in parts 2 and 3, which express *y*’s belief that his action together with some subset of the norms accepted by both will produce *x*’s response, and that without those rules there would be no such response. This is, therefore, a special case of the previous definition.
* The same distinctions between positive and negative constraints may be made.
* Note that since *N* creates the conditions under which *T* is degraded for noncompliant agents, *N* provides the mechanism of enforcing compliance.
* Express the claim that *x* normatively constrains *y* as *x*/*Ny.*

The obvious definitions apply for normative constraint in the set case, and the discriminations between positive and negative constraint can also be made in the obvious way, as can the definitions of constraint sequences and of distant and proximate constraint.

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| **Example:**An alternative categorization of powers was given by John French and Bertram Raven in "The Bases of Social Power" in *Studies in Social Power*, ed. D. Cartwright (Ann Arbor:University of Michigan Press, 1959) pp. 150-65, augmented by Raven, Bertram H. (1992) “A power interaction model of interpersonal influence: French and Raven thirty years later”, *Journal of Social Behavior and Personality*, 7:2, pp. 217-244. Their categories are describable in the formalism provided so far.1. *Coercive Power*: power based on fear. Which is identical to our notion of negative constraint
2. *Reward Power*: power based on the ability to distribute something that others value

Corresponding to our positive constraint1. *Legitimate Power*: power based on one’s position in the formal hierarchy.This is a form of normative dominance in which the norms are those associated with a particular type of organization of agents. We shall consider this category of normative dominance in a later section. Note that this definition limits the range of authority (legitimate power) much more than Weber’s definition. It does not include his categories of traditional and charismatic authority, nor are they reducible to any of the other forms of power listed by French and Raven.
2. *Expert Power*: power based on one’s expertise, special skill, or knowledge.For *x* to have expert power over *y* in a certain circumstance with respect to certain interests it suffices that *y* believes that amongst the qualities of *x* are some such that in that circumstance, the possessor of those qualities would perform better than *x* with respect to those interests, and also that *x* desires that *y* should perform as well as possible.

*x* has expert power over *y* in context *cx,y* with respect to the interests *Iy’*  *Iy* iff*By*[ (*qx’*  *qx*)[ *qx’*  *qy* & (*T*(*C*(*Ay*(*qx’**qy*, *cy*), *cy*), *Iy’*) > *T*(*C*(*Ay*(*qy*, *cy*), *cy*), *Iy’*))] & *Dx*[ *T*(*C*(*Ay*(*qy*, *cy*), *cy*), *Iy’*) = max{ *T*(*C*(*ay*, *cy*), *Iy’*) : *ay*  *Ex*[*y* ]} ]One notes that a reasonable definition for ‘expert power’ in the developed formalism requires explicit reference to the circumstances and interests involved, which marks an advance on the plain language of the French and Raven definition, which leaves too much to be developed by actual users of the concept.1. *Referent Power*: power based on identification with a person who has desirable resources or personal traits.We can say that *x* has referent power over *y* when *y* identifies some of *x*’s interests with its own interests. Thus:

*x* has referent power over *y* iff (*ix*  *Ey*[*x* ]) *ix*  *Ey*[*y* ]1. *Informational Power*: power based on the possession of valuable information.

In so far as this is power and not mere influence, this is identical to ‘expert power’. |

***Domination Networks***

The relation of domination can create types of network that require consideration. The development here is once again modelled on the development for action networks.

We have already given the definition of *xy* as a binary relation indicating the fact (not the mere possibility) of the domination by *x* of *y*, which we write as *x*>*y*.

* Adopt the alternative notation *x* | *y*.
* If *x**y* and *y**x* thenwe might wish to write *x* || *y*, but we would probably prefer to make the distinctness of the domination relations part of the notation. We will not develop this notation further.
* If we wish to specify the domination relation write ** *x* | *y,* or, if the element is part of a graphical representation of a collection of dominations all due to the same domination relation, then let ** be a label for that representation.

If *x*>*Ny* adopt the notation *N*: *x* | *y*, or, if the action element is part of a graphical representation of a collection of actions all governed by the same norm formation, then let *N* be a label for that representation.