

The Criterion Sort below was used by Warfield (2003) for free-ranging rhesus monkeys living in naturalistic groups in a naturalistic setting. It is provided here as an example of both a Q-set item list and a Criterion Sort. The Criterion sort arrays the items from those Most Characteristic of a hypothetical individual that uses its mother as a secure base from which to explore and as a safe haven, to those Least characteristic of such a hypothetical individual. Another example of a Criterion Sort can be found in Kondo-Ikemura & Waters (1995) which was used for Japanese macaque infants from 1 to 3 months of age living in a 50-acre compound. An unpublished Criterion Sort currently in use with captive rhesus monkeys in 35m x 35m compounds observed from a tower outside the enclosure is available on request.

Q-SET ITEM	SECURITY CRITERION PILE PLACEMENT
4. When infant geckers, screeches, coos or gives another distress vocalization, vocalizing stops as soon as contact is made with mother. <i>Low:</i> Distress vocalizations continue even after contact is made with mother.	9.0
7. Infant keeps track of mother's location when he plays away from her. <i>Middle:</i> Infant rarely away from mother.	9.0
14. When threatened, aggressed or displaced, infant seeks proximity to mother soon after the infant's initial response (which may, or may not, have involved going to mother immediately). <i>Low:</i> Infant does not join or seek mother soon after being threatened, aggressed or displaced.	9.0
18. Infant returns to mother and actively solicits comfort from mother when wary, fearful or otherwise upset. <i>Low:</i> Sits, freezes and/or gives distress vocalization until mother retrieves or fails to retrieve.	9.0
24. Infant clearly shows a pattern of using mother as a base from which to explore. Moves out to play, returns or plays near her and moves out to play again, etc. <i>Low:</i> Always away from mother or near mother when playing -- no out-and-back "refueling" behavior and no repeated visual checking of mother.	9.0
34. Infant moves along with mother as she goes from place to place; does not have to be signaled to follow; does not become distressed. <i>Low:</i> Does not follow when mother moves unless mother	9.0

	<p>signals (e.g. waits while looking over shoulder at infant or lowers shoulder) or waits until he follows.</p> <p><i>Middle:</i> Decision to move along with mother is not left up to infant, (e.g. mother picks up infant before moving).</p>	
41.	<p>When mother enters corral, infant follows her without showing signs of distress.</p> <p><i>Low:</i> When mother enters corral, infant follows or stays outside showing signs of distress such as vocalizing, self-directed behavior, scanning, seeking comfort from another monkey.</p>	9.0
48.	<p>Departures from mother are spontaneous; infant leaves mother readily and calmly.</p> <p><i>Low:</i> Infant normally only leaves mother reluctantly or hesitantly.</p>	9.0
74.	<p>When startled, infant goes straight to mother and tries to make and maintain contact (even if mother avoids or rejects.).</p> <p><i>Low:</i> When frightened or startled, infant does not attempt to make contact immediately with mother, although she is available.</p> <p><i>Middle:</i> Mother is not available when infant is startled.</p>	9.0
89.	<p>While producing distress vocalizations, infant attempts to regain contact with mother.</p> <p><i>Low:</i> While infant produces distress vocalizations, he does not attempt to regain contact, even when he has regained proximity (.6m) – distress vocalizations continue while in proximity.</p>	9.0
28.	<p>When mother moves or changes activity, infant follows visually (may also follow physically).</p> <p><i>Low:</i> Infant does not look toward mother (or follow) when mother changes activity.</p>	8.0
37.	<p>Without mother within 3 meters, infant forages in the corral purposively acquiring chow and taking time to eat it.</p> <p><i>Middle:</i> Less than 12 weeks of age.</p>	8.0
45.	<p>Infant clings on or touches mother in a comfortable posture and position when in contact with mother.</p> <p><i>Low:</i> Touches or clings on mother in an awkward posture or position when in contact with mother.</p>	8.0
51.	When something in environment frightens infant, his fear appears	8.0

	<p>reduced if he moves closer to mother or he makes contact with her or she with him.</p> <p><i>Low:</i> Appears to remain fearful, even if he approaches, makes contact with, or is contacted by mother.</p>	
53.	<p>Infant solicits or cooperates with grooming from mother.</p> <p><i>Low:</i> Does not cooperate with mother's grooming attempts; leaves or tries to leave other while he is grooming.</p> <p><i>Middle:</i> Mother never attempts to groom infant.</p>	8.0
61.	<p>When mother is nearby, infant is bolder or more confident to play or explore.</p> <p><i>Low:</i> Infant's boldness and tentativeness is the same regardless of mother's location.</p>	8.0
67.	<p>Enters corral without mother, perhaps warily, but without distress.</p> <p><i>Middle:</i> Less than 12 weeks of age.</p>	8.0
76.	<p>After 12 weeks, infant generally plays more than 3 meters from mother. Before 12 weeks, generally plays within 3 meters.</p> <p><i>Low:</i> After 12 weeks, infant generally plays closer than 3 meters from mother. Before 12 weeks, generally plays beyond 3 meters.</p>	8.0
79.	<p>Infant will engage in quiet or active rough-and-tumble play with peers.</p> <p><i>Low:</i> Does not play much, even when "invited" or nearby peers are playing.</p>	8.0
94.	<p>Infant accepts non-aggressive maternal rejections (e.g. blocking, turning away, pushing off or away; but not hitting, slapping, biting, threatening, stepping on, etc.) without distress vocalization, aggression, or immediate and persistent attempts to regain contact.</p> <p><i>Low:</i> Protests non-aggressive rejection with distress vocalization, aggression or immediate and persistent attempts to regain contact.</p>	8.0
9.	<p>When infant returns from exploration or play, he clings on mother and/or sucks on her nipple, and/or touches her comfortably.</p> <p><i>Low:</i> When returning from exploration or play, infant fails to touch mother or does so fearfully or tentatively or whoos while doing so.</p>	7.0
13.	<p>When social play gets rough and active, infant continues to play confidently.</p> <p><i>Low:</i> Not confident in rough play; freezes, flees, geckers or</p>	7.0

	screeches.	
22.	<p>If left in the company of familiar juveniles or adult females other than mother, infant accepts mother's leaving without following or distress vocalizations.</p> <p><i>Low:</i> Even if left with familiar juveniles or adults, follows mother's leaving producing distress vocalizations.</p> <p><i>Middle:</i> Never becomes distressed by mother's leaving in any situation.</p>	7.0
32.	<p>Infant initiates social play with peers or juveniles.</p> <p><i>Low:</i> May respond to play invitations, but does not initiate social play on his own.</p>	7.0
36.	<p>If infant retreats to a safe place or another monkey when frightened or startled he still scans for mother or gives distress vocalizations.</p>	7.0
60.	<p>If infant is not next to mother when infant is attacked, he runs directly to mother, or scans for mother.</p> <p><i>Low:</i> Escapes or counterattacks on his own without mother's help. (Does not run to mother or scan for her.)</p> <p><i>Middle:</i> Mother intervenes immediately on infant's behalf.</p>	7.0
66.	<p>Infant appears relaxed when grooming mother or touching her coat when sitting next to her.</p> <p><i>Low:</i> Infant appears wary or inhibited in touching mother's coat or grooming her.</p> <p><i>Middle:</i> No attention to mother's coat.</p>	7.0
83.	<p>Infant returns to mother between bouts of social play.</p> <p><i>Low:</i> Does not return to mother or sit close to any other monkey between bouts of social play.</p>	7.0
88.	<p>Infant approaches mother and stays closer than usual when unusual happenings occur (e.g. conflicts involving group members, sudden environmental changes, risk events, etc.). (He does not necessarily approach quickly or vocalize.)</p> <p><i>Low:</i> Does not approach mother or any other monkey when unusual happenings occur.</p>	7.0
90.	<p>When using a non-mother as a secure base from which to explore infant still scans for mother or gives distress calls.</p> <p><i>Low:</i> When using a non-mother as a secure base from which to explore, infant does not scan for mother or give distress calls.</p>	7.0

26.	<p>Infant approaches mother to observe what she is doing; shows much interest in mother's behaviors.</p> <p><i>Low:</i> May or may not be attentive to mother's behaviors, but rarely approaches her to observe what she is doing.</p>	6.0
31.	<p>When a situation looks dangerous or threatening, infant looks at mother before taking action.</p> <p><i>Low:</i> Takes action without using mother's behaviors as a cue.</p> <p><i>Middle:</i> Takes no action.</p>	6.0
38.	<p>Infant is interested in social environment; watches social interactions between adults.</p> <p><i>Low:</i> Does not watch social interactions between adults closely or often.</p>	6.0
40.	<p>When frightened or upset, if infant goes to a monkey other than its mother, it is a monkey that is familiar to him and which tolerates him.</p> <p><i>Low:</i> When frightened or upset, if infant goes to a monkey other than its mother, it may be any monkey, whether or not familiar to him or tolerant of him.</p> <p><i>Middle:</i> Do not know whether non-mother is familiar to infant. Infant does not go to monkey other than his mother.</p>	6.0
46.	<p>Infant walks, runs and climbs without bumping, stumbling or falling.</p> <p><i>Low:</i> Bumps, stumbles or falls occur during travel, exploration or play.</p>	6.0
52.	<p>Returning to mother after play or exploration, infant seeks signs of tolerance or acceptance from mother before he makes contact; pauses, signals or waits for mother to complete contact.</p> <p><i>Low:</i> Tries to cling on mother directly, without pausing to seek signs of tolerance or acceptance from mother. (Mother may show her acceptance and sit still or reach for infant)</p>	6.0
57.	<p>After receiving threats or aggression from non-mother while foraging at a patch occupied by non-mother (male or female), infant finds and moves to another comparable patch and continues foraging.</p> <p><i>Low:</i> Infant stops foraging altogether after receiving threat or aggression from non-mother who foraged in same patch.</p>	6.0

70.	If an individual peer or peers play nearby within range of infant's notice, he either actively joins in or plays close by in comparable manner (i.e. parallel play). <i>Low:</i> Avoids or ignores peers that are playing nearby.	6.0
72.	When mother is not nearby, infant actively solicits comfort or protection from a non-mother when frightened or startled <i>Low:</i> Sits, flees and/or gives distress vocalization until mother retrieves. <i>Middle:</i> No tolerant monkeys nearby; or infant seeks out mother (including visually).	6.0
80.	Infant will go greater distance or longer time from mother than he will allow mother to go from him. <i>Low:</i> Tolerates both mother-initiated and self-initiated separation and distance equally.	6.0
91.	Infant spends more time with mother than any other non-infant.	6.0
1.	When infant attempts to get on nipple and is prevented from doing so or is rejected, infant persists despite being hit or bitten. <i>Low:</i> When infant attempts to get on nipple and is threatened, hit or bitten - infants no longer persists.	5.0
6.	When mother interacts with adult monkeys, infant tries to intervene; climbs on or between them. <i>Low:</i> Infant sits nearby without interaction. <i>Middle:</i> Tolerates or joins in mother's social interactions.	5.0
23.	Infant tries to interrupt mother when she cares for siblings or other infants. <i>Low:</i> Infant joins in cooperatively or sits nearby attending to interactions without interrupting. <i>Middle:</i> There are no siblings or mother does not give care to other infants.	5.0
29.	When mother leaves infant, he becomes distressed and follows with geckering, screeching or other distress vocalizations. <i>Low:</i> Sits right where he is and gives distress vocalizations. <i>Middle:</i> Infant stays or follows without distress.	5.0
35.	When infant is distressed or injured, mother is the only one he allows to comfort him. <i>Low:</i> Accepts comforting from monkeys other than mother, if offered.	5.0

43.	Infant approaches one or two adult males within one meter. <i>Low:</i> Does not approach any adult males on his own.	5.0
47.	Infant seeks to be held, carried, or protected by adult monkeys other than mother when she is occupied with other activities. <i>Low:</i> Does not seek care-taking from adults other than his own mother.	5.0
50.	Infant ignores most bumps, falls or startles. <i>Low:</i> Runs to mother, gives distress vocalization, stops play or sits alone, etc.	5.0
64.	Infant uses a part of mother's body as a play object or jumping platform. <i>Middle:</i> Mother does not allow.	5.0
81.	When approaching subadults or adults other than mother, infant seeks signs of tolerance or acceptance before he makes contact; pauses, signals or waits for other to complete contact. <i>Low:</i> Tries to interact without sign of tolerance or acceptance from non-mother.	5.0
85.	After receiving threats or aggression from mother while foraging at a patch occupied by her, infant finds and moves to another comparable patch and continues foraging. <i>Low:</i> Infant stops foraging altogether after receiving threat or aggression from mother who was foraging in same patch.	5.0
93.	Infant tolerates being held, touched or carried by adult or subadult non-mothers (male or female).	5.0
11.	Infant approaches subadult or adult female monkeys other than mother to play, explore or otherwise interact, without hesitation. <i>Low:</i> Avoids other subadult or adult female monkeys and does not approach them.	4.0
17.	When mother is feeding, sleeping or manipulating objects, infant tries to interrupt if he is unoccupied; calls or climbs on her. <i>Low:</i> Tolerates or joins in mother's non-social activities; does not demand to be center of her attention.	4.0
33.	When infant is in mother's ventrum, he is always on nipple. <i>Low:</i> When infant is in mother's ventrum, he is never on nipple.	4.0
44.	Infant solicits and/or cooperates with grooming from juveniles or	4.0

	adults other than mother. <i>Low</i> : Does not cooperate with grooming from juveniles or adults other than mother. <i>Middle</i> : Monkeys other than mother never groom infant.	
54.	Persists in foraging at a patch (minerals, water, chow, forage) after being threatened by non-mother, but does not receive aggression. <i>Low</i> : Persists in foraging at a patch (minerals, water, chow, forage) after being threatened by non-mother, but receives aggression.	4.0
62.	Infant periodically interrupts active social play to approach and make contact with mother. (May or may not return and continue social play) <i>Low</i> : Does not interrupt active social play to seek mother; may return to her after the bout of play.	4.0
65.	Infant shows great interest in non-social exploration or play. <i>Low</i> : Only interested in social play.	4.0
69.	Infant spends more time away from mother than he does in proximity, contact or interaction with her. <i>Low</i> : Spends more time in proximity, contact or interaction with mother than in exploration or play away from mother. (Excluding sleeping time.)	4.0
78.	Infant retreats exclusively to monkeys when frightened. <i>Low</i> : When frightened, retreats to a place (e.g. onto a fence, under a bush, up a tree) rather than a monkey.	4.0
82.	Infant scratches body persistently, when alone and unoccupied (no evident wound, mange, etc.). <i>Low</i> : Rests, plays or grooms without persistent scratch.	4.0
92.	Infant solicits social interactions from adult or sub-adult non-mothers (male or female).	4.0
3.	Constantly monitors and stays close to mother while in the corral, foraging nervously, easily distracted or interrupted. <i>Middle</i> : Less than 12 weeks of age. <i>Low</i> : Forages smoothly in corral, may or may not attend to mom but does not interrupt foraging each time she moves	3.0
10.	When familiar adult females other than mother approach or sit nearby, infant stops play, flees or returns to mother. (Exclude adult females the mother herself avoids, is displaced by, or bares teeth	3.0



<p>to.)</p> <p><i>Low:</i> Play or exploration is not disrupted when adult females approach.</p>	
<p>21. Infant ignores, avoids or rejects play invitations.</p>	<p>3.0</p>
<p>30. Infant tends to be quiet and withdrawn.</p> <p><i>Low:</i> Infant is alert, lively and attends to his surroundings when not asleep.</p>	<p>3.0</p>
<p>39. When mother punishes infant's behaviors, he returns to the same behaviors without hesitancy.</p> <p><i>Low:</i> Does not repeat punished behaviors or does so hesitantly.</p>	<p>3.0</p>
<p>56. Infant displays distress-related motor patterns (e.g. auto-oral, stereotypies, hunched shoulders and lowered head, etc.) in a low stress situation or long after a stressful experience passes.</p> <p><i>Low:</i> Does not display such patterns in low stress situations and only briefly immediately after stressful experiences.</p>	<p>3.0</p>
<p>58. If infant receives threats or aggression while competing with mother for same food or minerals (but not water) at a patch, he stops foraging altogether.</p>	<p>3.0</p>
<p>68. Infant gets off mother's ventrum, but stops near mother or returns to be held again.</p> <p><i>Low:</i> Once he gets off of mother's ventrum, infant goes directly to play.</p>	<p>3.0</p>
<p>73. When exploration or solitary play is interrupted, infant gives up easily.</p> <p><i>Low:</i> Resumes activities after they are interrupted.</p>	<p>3.0</p>
<p>84. Infant plays roughly and in cruel way with peers. (Peers give distress vocalization or retreat from play.)</p> <p><i>Low:</i> Plays active games without hurting peers.</p> <p><i>Middle:</i> Play is never very active.</p>	<p>3.0</p>
<p>2. Infant engages in self-directed behaviors other than self-grooming, e.g. manipulates or licks digits, limbs, coat, genitals, etc.</p> <p><i>Low:</i> Infant's self-directed behaviors consist solely of self-grooming or scratching.</p>	<p>2.0</p>
<p>8. Infant adopts awkward posture when carried by mother.</p> <p><i>Low:</i> Adjusts his posture to mother's movement quickly and</p>	<p>2.0</p>

	comfortably.	
16.	When mother physically rejects infant's bid for contact, he geckers, screeches or throws tantrums. (May or may not persist in trying to make contact.) <i>Middle</i> : Mother does not physically reject infant during observation.	2.0
25.	Foraging at a patch occupied by mother (i.e. competing for same minerals or food - not water), infant receives threats or aggression from her. <i>Low</i> : Mother tolerates infant when infant competes in a food or mineral patch.	2.0
27.	Protests maternal restrains with distress vocalization, aggression toward mother or very active motor attempts to get away. <i>Low</i> : Infant accepts maternal restrains without distress vocalization, aggression toward mother or very active motor attempts to get away. (Infant may still be trying to pull away by exerting force away from mother.)	2.0
49.	When a choice is available, infant prefers non-mother to mother.	2.0
55.	Infant vocalizes or moves closer showing distress when mother moves more than 10 meters away or out of sight. <i>Low</i> : Notices mother's moving away without giving distress vocalization or approaching. <i>Middle</i> : Mother never moves more than 10 meters away or out of sight.	2.0
71.	Infant jerks or throws tantrums in response to competent maternal caretaking (e.g. grooming, retrieving under threat, feeding, etc.). <i>Low</i> : Accepts mother's caretaking without jerks or annoyance unless it is necessarily uncomfortable.	2.0
77.	Persists in foraging at a patch occupied by mother, even after receiving threats or aggression from her. Mother escalates agonism until infant desists. <i>Low</i> : Infant persists; mother finally tolerates infant.	2.0
87.	Infant hesitates to approach, or retreats quickly from peers who are playing.. <i>Low</i> : Is confident during exploration and play; takes initiative with peers.	2.0
5.	Does not return to a stationery mother unless startled or otherwise	1.0

	<p>upset; does not return to or monitor mother during non-emergencies.</p> <p><i>Low:</i> Returns to mother from exploration and play spontaneously in non-threatening situation.</p>	
12.	<p>Infant does not visually monitor mother's location or activity changes; does not periodically "check back" with her visually.</p>	1.0
15.	<p>Infant does not follow when mother moves a long distance; instead infant vocalizes, scans repeatedly, waits to be picked up, or waits until mother stops to allow him to get on.</p> <p><i>Low:</i> Follows by himself.</p> <p><i>Middle:</i> Too young to walk long distance</p>	1.0
19.	<p>When mother enters the corral, infant remains outside the corral but appears to be monitoring mother.</p>	1.0
20.	<p>When infant becomes frightened and returns to mother, he clings on her for a long time even after the frightening event is over.</p> <p><i>Low:</i> Resumes prior activity, or commences a new activity, once frightening event is over.</p>	1.0
42.	<p>When mother is not nearby, infant uses a non-mother as a base from which to explore or play. Moves out to explore or play, returns or visually checks, and moves out again. Returns to mother when she is again nearby.</p> <p><i>Low:</i> Sits alone when mother not nearby. Does not engage in same activities as nearby peers. Appears inhibited by mother's absence.</p> <p><i>Middle:</i> No tolerant monkeys nearby during mother's absence.</p>	1.0
59.	<p>When infant spontaneously returns to mother in non-threatening situation, proximity or contact with mother is hurried, tentative, awkward or wary.</p> <p><i>Low:</i> Proximity or contact with mother is relaxed when infant returns to mother in non-threatening situations.</p>	1.0
63.	<p>When mother moves away from infant in calm situation, infant produces distress vocalization, clings, or throws tantrum.</p> <p><i>Low:</i> Notices, and/or follows without distress vocalization, clinging or tantrum.</p>	1.0
75.	<p>When infant coos, geckers, screeches or gives other distress vocalization, he does it intensely and for long time.</p> <p><i>Middle:</i> No distress vocalization during observation.</p>	1.0

86. Infant is sometimes unaware of mother's location and has to search for her.  <i>Low:</i> Even if social situation becomes chaotic, infant knows where mother is and returns to her without mistakes.	1.0
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Kondo-Ikemura, K., & Waters, E. (1995). Maternal behavior and infant security in old world monkeys: conceptual issues and a methodological bridge between human and nonhuman primate research. In E. Waters, B. E. Vaughn, G. Posada & K. Kondo-Kimura (Eds.), *Caregiving, Cultural, and Cognitive Perspectives on Secure-Base Behavior and Working Models: New Growing Points of Attachment Theory and Research* (Serial No. 244, Vol. 60, Nos. 2-3 ed., pp. 97-110). Chicago: The University of Chicago Press.

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