

# A Hierarchical Theme Recognition Model for Sandplay Therapy

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## Appendix

### A.1 The definition of themes in sandpay

According to [3], Mitchell and Friedman extensively documented and summarized a range of sandplay themes, which have proven to be crucial and effective tools for evaluating clients' states. Within their work, they delineated two distinct categories of themes: the 10 healing themes and the 10 wounded themes. The split theme we are focused on is a type of wounded themes. The definitions and examples of these themes are shown in the Table 1 and Table 2.

### A.2 The psychological attributes of the sand object

Drawing from the principles of sandplay analysis[1–3], we have organized 7 key psychological attributes for each sand object, including polarity, life, spiritual/material, static/dynamic, prototype/non prototype, connection, attack, and defense. The dimensions and examples of each attribute are shown in Table 3.

### A.3 Statistical analysis of the SP<sup>2</sup>

Firstly, we analyze the number of occurrences of each sand object (a total of 494 sand objects). As shown in Fig 1(a), it can be seen that the distribution of sand objects follows a long-tail pattern, posing the challenge for the model in perceiving the basic semantic information associated with these objects. Moreover, we count the number of sand objects appearing in each sandplay (see Fig 1(b)). The analysis shows that each sandplay contains an average of 15.43 sand tobjects. It is noteworthy that obtaining psychological labels necessitates the integration of information from all sand objects, thus presenting a challenge for the model in recognizing the psychological themes information embedded within the sandplay.

In addition, we conduct statistics on the number of positive and negative samples of the split theme (positive samples mean the sandplay has the split theme), as shown in Table 4, and it can be seen that the number of positive and negative samples is relatively balanced.

**Table 1.** The definition and example of healing themes.

Theme	Definition	Example
Bridging	Connection between elements, joining of opposites	A ladder joins earth and tall trees; a bridge links an angel and devil
Centered	In center of a tray, elements are aesthetically balanced or a union or opposites occurs	A man and woman married; mandala centered in the tray
Energy	Alive, vital, intense energy is visible	Organic growth present, construction machines work on a task, airplanes take off from a runway
Nurturing	Nourishment or help are provided to support growth and development	A mother feeding babies, supporting family groups, nurse helps a patient, presence of food
Changed	Sand and/or objects are creatively changed or used	Sand is contoured to build a land bridge; sand is moved/stacked as an essential part of a lunar compound, a house is built from twigs picked up on a walk to school
Birthing	Emergence of a new development	A baby is born, a flower opens, a bird incubates eggs
Spiritual	Religious or spiritual symbols present, such as supernatural beings, worshipping figures or numinous items	Buddha overlooking newly married couple
Going Deeper	Discovery of a deeper dimension	A clearing is made, a treasure unearthed, a well dug, a lake explored
Integrated	Congruent, organized idea encompasses entire tray, unity of expression	Day at the zoo, baseball game, abstract construction unifying whole tray
Journeying	Movement along a path or around a center	A knight follows a trail; a Native American paddles a canoe down a stream

**Table 2.** The definition and example of wounded themes.

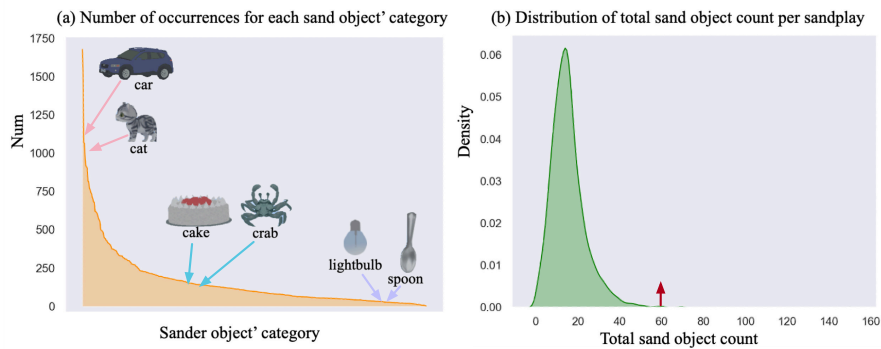
<b>Theme</b>	<b>Definition</b>	<b>Example</b>
Empty	Reticence to use figures or lifeless feeling with lack of energy and curiosity	Nearly empty tray with only one dead tree placed in a corner
<b>Split</b>	Parts of tray appear separated or detached	River, fence, or elephants placed from bottom to top of tray seem to divide tray
Neglected	Figure is isolated from possible support	A baby in a high chair while mother is sleeping in the next room
Threatened	Menacing or frightening events & the ability of the endangered figures to meet the experience	Aggressive animals surrounding a small child
Hidden	Figures buried or hidden from view	A gun hidden behind a house; a witch buried in the sand under a tree
Prone	Figures normally upright are intentionally placed in reclining, fallen position	A standing pregnant woman placed face down in the sand
Hindered	Possibility of new growth is impeded or hindered	A boat moving into new waters, while under siege by an army
Injured	Figures with injuries or in the process of being injured	A bandaged man lying on a stretcher; a cowboy placed in the mouth of a dinosaur
Chaotic	Haphazard, fragmented or formless arrangement	Objects flung into the tray, boundaries or outer reality disregarded, overall appearance ins jumbled/disconnected
Confined	Figure or groups normally free are entrapped or caged	An agonized figure is placed in a cage; a sand wall is built around an old woman

**Table 3.** The dimensions and examples of psychological attributes

Attribute	Diminitions	Example
Polarity	positive, neutral, negative	The hospital is a neutral sand object; The amusement park is a positive sand object; The witch is a negative sand object.
Life	living, nonliving	The dog is a living sand object; The car isn't a living sand object.
Spiritual/Material	spiritual, material	The boat is a material sand object; The pastor is a spiritual sand object.
Static/Dynamic	static, dynamic	The horse is a dynamic sand object; The pine tree is a static sand object.
Prototype	prototype, non prototype	The boy is a prototype sand object; The cat isn't a prototype sand object.
Connection	connected, separate, others	The road is a connected sand object; The fence is a separate sand object.
Attack	attack, non attack	The tiger has the attack attribute; The cow doesn't have the attack attribute.
Defense	defense, non defence	The tortoise has the attack attribute; The elephant doesn't have the attack attribute.

**Table 4.** The number of positive samples (*i.e.*, with the split theme) and negative samples in the SP<sup>2</sup>, as well as the division of the Training, testing, and validation sets.

Type	Postive	Negative	Total
<b>Train</b>	1,843	2,157	4,000
<b>Val</b>	234	266	500
<b>Test</b>	226	274	500
<b>Total</b>	2,303	2,697	5,000

**Fig. 1.** Two statistical Results of the SP<sup>2</sup> Dataset. (a) illustrates the long-tail distribution characteristic of each sander object's category. (b) indicates that the total number of sand objects present in each sandbox is generally less than 60 (marked by red arrow).

## References

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