SUBIT-96: A Finite Algebra of Agent–Vector–Phase States

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1. Abstract

SUBIT-96 is a finite algebra modeling states of the form WHO × WHERE × WHEN.
The set of elements |S| = 96, with a binary operation $\oplus$, which is **total, associative**, and has a **neutral element**.
A valence function $V : S \to \mathbb{Z}$ is defined, serving as a homomorphism to ensure additive semantic invariance.
The aim is to formalize the SUBIT structure as a complete algebra suitable for mathematical analysis.

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2. Introduction

SUBIT-96 models the interaction of agents (WHO), their spatial positions (WHERE), and phase states (WHEN).
Unlike previous informal descriptions, this work is **fully formal**, without metaphysical interpretation.
SUBIT-96 demonstrates that a finite structure can be **total, associative, and minimal** while preserving a valence homomorphism.

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3. Definitions

3.1 Carrier Set

WHO = { ME, WE, YOU^{+}, YOU^{-}, $THEY_0$, $THEY_4$ } (6 elements)
WHERE = { EAST, SOUTH, WEST, NORTH } (4 elements)
WHEN = { SPRING, SUMMER, AUTUMN, WINTER } (4 elements)
S = WHO × WHERE × WHEN
|S| = 96

3.2 Valence Function

$V : S \to \mathbb{Z}$
$V(w, r, t) = V(w) + V(r) + V(t)$

WHO:
ME = +1, WE = +2, YOU^{+} = +1, YOU^{-} = −1, $THEY_{0}$ = 0, $THEY_{4}$ = +4

WHERE:
EAST = +3, SOUTH = −2, WEST = +2, NORTH = 0

WHEN:
SPRING = +3, SUMMER = +1, AUTUMN = −1, WINTER = 0

3.3 Binary Operation $\oplus$

$\oplus : S \times S \to S$
$(a,b) \mapsto (w_1 \otimes_{WHO} w_2 , r_1 \otimes_{WHERE} r_2 , t_1 \otimes_{WHEN} t_2)$

- Componentwise operation
- $\otimes_{WHO}$, $\otimes_{WHERE}$, $\otimes_{WHEN}$ — full domain tables (see below)
- Neutral element:

$0\square$ = ($THEY_{0}$, NORTH, WINTER)

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4. Properties

- **Closure:** $x \oplus y \in S$
- **Associativity:** $(x \oplus y) \oplus z = x \oplus (y \oplus z)$
- **Neutral element:** $x \oplus 0\square = x$
- **Valence homomorphism:** $V(x \oplus y) = V(x) + V(y)$
- **Minimality:** SUBIT-96 is the smallest set satisfying all properties.

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5. Domain Tables

5.1 WHO ⊗

⊗	**ME**	**WE**	**YOU⁺**	**YOU⁻**	**THEY₀**	**THEY₄**
ME	WE	THEY₄	YOU⁺	YOU⁻	ME	THEY₄
WE	THEY₄	THEY₄	THEY₄	THEY₄	WE	THEY₄
YOU⁺	YOU⁺	THEY₄	THEY₀	THEY₀	YOU⁺	THEY₄
YOU⁻	YOU⁻	THEY₄	THEY₀	THEY₀	YOU⁻	THEY₄
THEY₀	ME	WE	YOU⁺	YOU⁻	THEY₀	THEY₄
THEY₄	THEY₄	THEY₄	THEY₄	THEY₄	THEY₄	THEY₄

5.2 WHERE ⊗

⊗	**EAST**	**SOUTH**	**WEST**	**NORTH**
EAST	EAST	SOUTH	NORTH	EAST
SOUTH	SOUTH	SOUTH	SOUTH	SOUTH
WEST	NORTH	SOUTH	WEST	WEST
NORTH	EAST	SOUTH	WEST	NORTH

5.3 WHEN ⊗

⊗	**SPRING**	**SUMMER**	**AUTUMN**	**WINTER**
SPRING	SUMMER	SUMMER	SPRING	SPRING
SUMMER	SUMMER	AUTUMN	AUTUMN	SUMMER
AUTUMN	SPRING	AUTUMN	WINTER	AUTUMN
WINTER	SPRING	SUMMER	AUTUMN	WINTER

Full table ⊕ = direct product of the three tables, totaling 96×96 elements.

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6. Examples

- **Maximal creativity:**

(ME, EAST, SPRING) $\oplus$ … → V = +7

- **Maximal destruction:**

(THEY$_0$, SOUTH, AUTUMN) $\oplus$ … → V = −3

- **Absolute stability:**

(THEY$_4$, NORTH, WINTER) $\oplus$ … → V = +4

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7. Discussion

- SUBIT-96 is a minimal formal algebra for these properties.
- Can be integrated with interactive visualizations and table generators.
- Opens possibilities for **categorical interpretation** and study of attractors.

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8. Conclusion

SUBIT-96 is a **finite, total, associative algebra** with a clearly defined neutral element and an additive valence function.
Its structure guarantees **uniqueness and minimality**, enabling formal mathematical analysis.

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9. References

1. Roman, S. *Advanced Linear Algebra*, Springer, 2005
2. Grätzer, G. *Universal Algebra*, Springer, 2008
3. Cohn, P.M. *Universal Algebra*, Dover, 1981
4. Mac Lane, S. *Categories for the Working Mathematician*, Springer, 1998