Circular Recursive Distinctioning

By Divyamaan Sahoo

Abstract

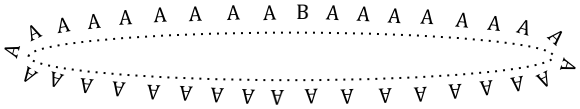
This paper introduces 1D Recursive Distinctioning on circular strings.

Keywords: o, oo, ooo, 1D Recursive Distinctioning, circular string.

Kauffman and Isaacson[1] introduce Recursive Distinctioning (RD) via a specialized alphabet (SA), which consists of letters =,], [, and O. RD describes distinctions in the neighborhood of each character of a string and the SA allows us to see this process in action. For an arbitrary alphabet consisting of two distinct letters, say A and B, the middle A of AAA is replaced by =, the middle B of ABA is replaced by O, the middle A of AAB is replaced by], and the middle A of BAA is replaced by [.

Hence, … A A A A A A B A A A A A A … can be replaced by … = = = = =] O [= = = = = …

Consider RD on the circular string AAAAAAAAAAAAAAAABAAAAAAAAAAAAAAAA:



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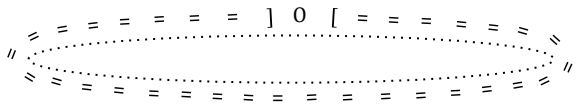

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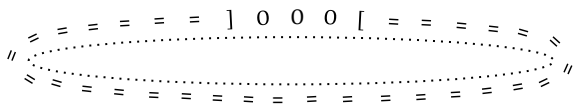

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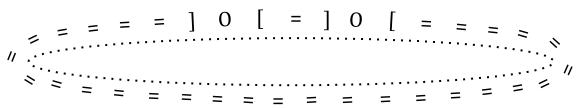
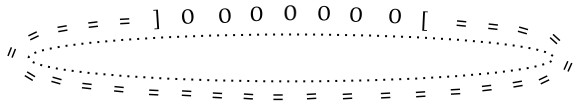


is replaced by

[1] Louis H. Kauffman and Joel Isaacson, "Recursive Distinctioning," *Journal of Space Philosophy* 5, no. 1. (Spring 2016): 9-64.



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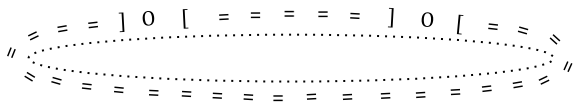

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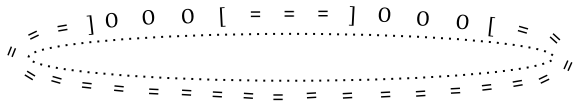

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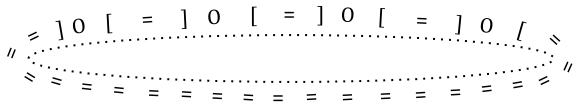

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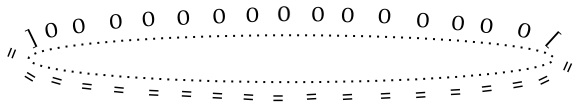

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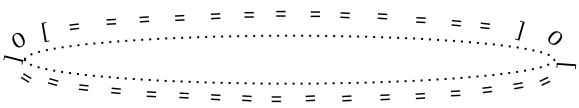

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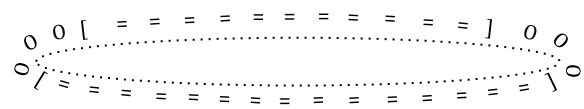

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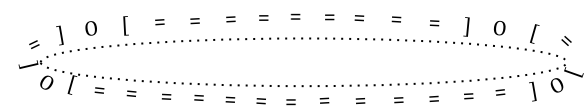

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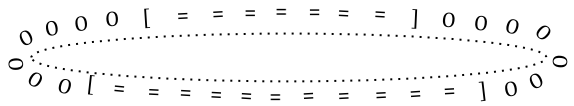

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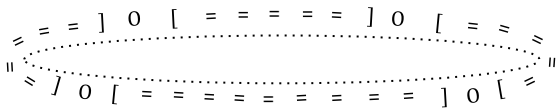

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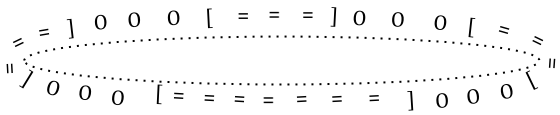

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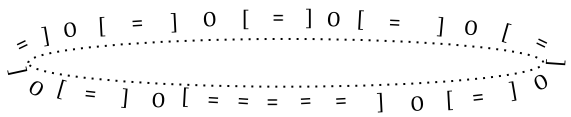

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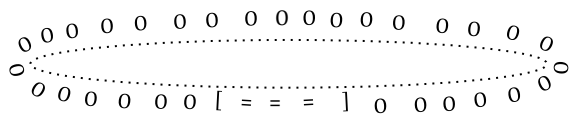

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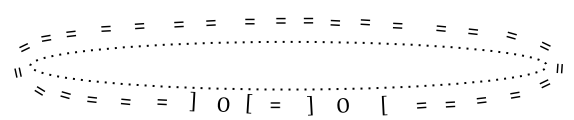
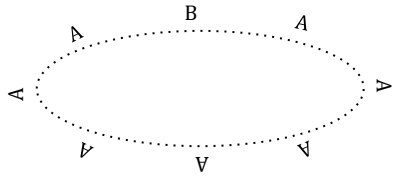


= S3, which is replaced by S4, and so on.

Now consider RD on the circular string AAABAAAA:

A	A	A	B	A	A	A	A	is replaced by
=	=	]	O	[	=	=	=	is replaced by
=	]	O	O	O	[	=	=	is replaced by
]	O	[	=	]	O	[	=	is replaced by
O	O	O	O	O	O	O	O	is replaced by
=	=	=	=	=	=	=	=	

Thus,



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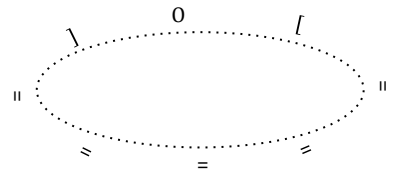

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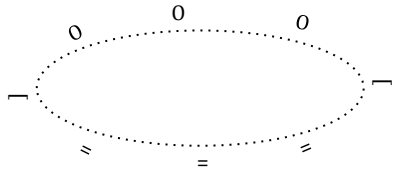

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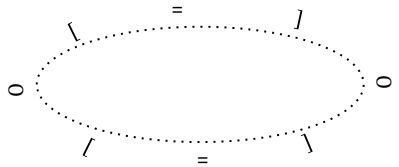

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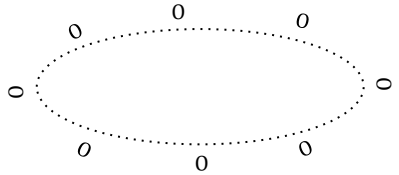

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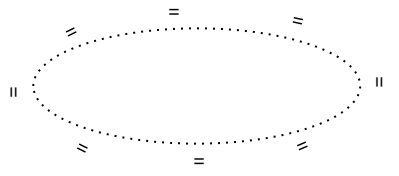
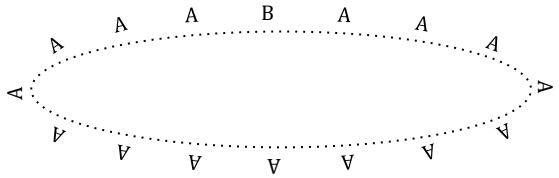


Finally, consider RD on the circular string AAAAAAABAAAAAAAA:

A A A A A A A B A A A A A A A A
= = = = = =] O [= = = = = = = =
= = = = =] O O O [= = = = = = =
= = = =] O [=] O [= = = = = =
= = =] O O O O O O O [= = = = =
= =] O [= = = = =] O [= = = =
=] O O O [= = =] O O O [= = =
] O [=] O [=] O [=] O [=] O [=
O O O O O O O O O O O O O O O O
= = = = = = = = = = = = = = = =

Every line above is a circular string and each successive line replaces the previous according to the rules specified by the SA. So,



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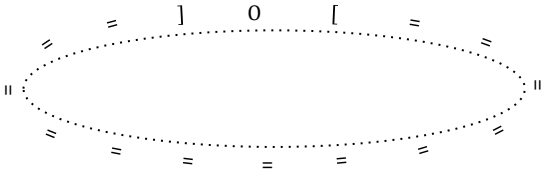

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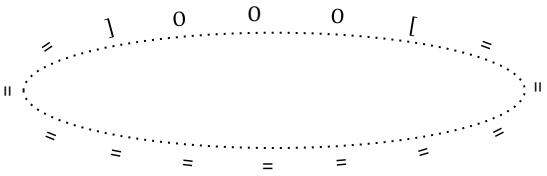

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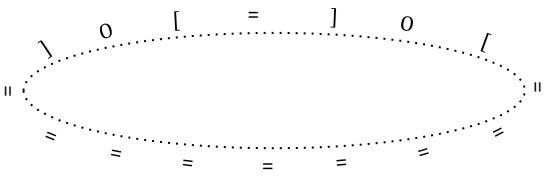

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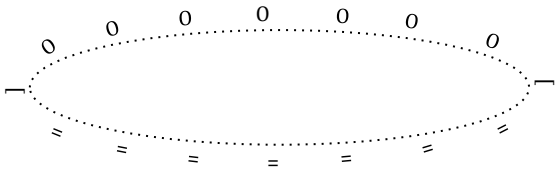

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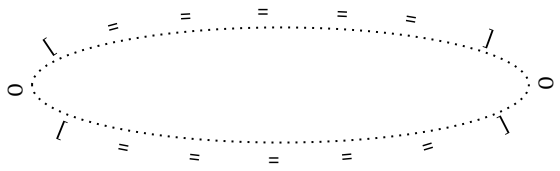

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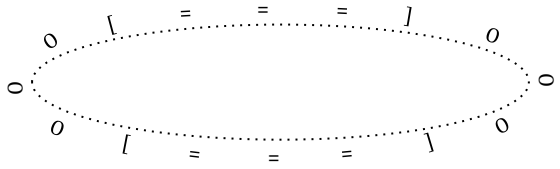

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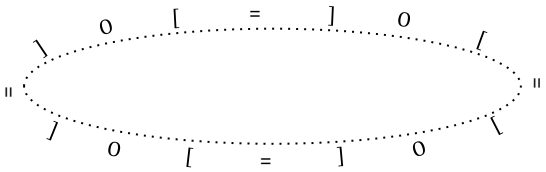

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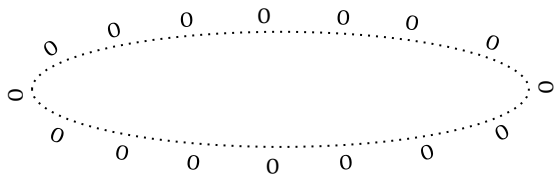

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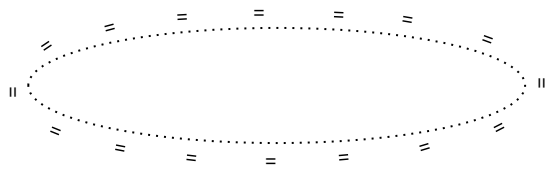

On a circular string consisting of one distinct character, RD behaves in two basic ways, depending on the number of characters in the string. There exists a family of circular string lengths, {2, 3, 4, 7, 8, 15, 16, 32, …}, for which RD begins by identifying the distinct character in the string and ends eventually by erasing all distinctions. For the remaining string

lengths {5, 6, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, …}, RD follows a repetitive pattern of varying periodicity.

Circular RD is 1D RD with periodic boundary conditions wherein the two end points of a 1D string neighbor one another. The elementary re-entering/circular string in circular RD extends the scope of adjacency in RD, finding natural application in the study of the Spencer-Brown modulator/reductor, an apparatus that feeds back into itself, returning a signal into the apparatus that created it, thereby yielding a recurring cycle

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About the Author: Divyamaan Sahoo, from Kolkata, India, received his Master of Fine Arts in Sound from the School of the Art Institute of Chicago in 2020, and his Bachelor of Arts from Bates College in 2017, triple majoring in Mathematics, Music Composition, and Philosophy. He is currently working as an independent researcher with Louis H. Kauffman and J. M. Flagg on the mathematics of George Spencer-Brown.

Editors' Notes: This is the final article honoring the late Joel Isaacson and his work with recursive distinctioning. Divyamaan Sahoo has contributed a brief and concrete example we hope the reader will find helpful in understanding a potentially challenging and abstract concept. ***Gordon Arthur and Mark Wagner.***