Comparing All-to-All Gathering with All-to-All Scattering

All-to-All Gathering (assume size of communicator world is N=4):

The size of the receiving buffer must be N * size of message sent from sending buffer.

```
int sendBuffer[8], receiveBuffer[32]; // initial contents of receiveBuffer undefined
MPI_Allgather(sendBuffer, 8, MPI_INT, receiveBuffer, 8, MPI_INT,
MPI_COMM_WORLD); // Note "receiveBuffer, 8" is correct, even though we will be receiving 32 values!
```

	`sendBuffer`	`receiveBuffer` after `MPI_Allgather` call
Rank 0	10, 11, 12, 13, 14, 15, 16, 17	10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 30, 31, 32, 33, 34, 35, 36, 37, 40, 41, 42, 43, 44, 45, 46, 47
Rank 1	20, 21, 22, 23, 24, 25, 26, 27	10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 30, 31, 32, 33, 34, 35, 36, 37, 40, 41, 42, 43, 44, 45, 46, 47
Rank 2	30, 31, 32, 33, 34, 35, 36, 37	10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 30, 31, 32, 33, 34, 35, 36, 37, 40, 41, 42, 43, 44, 45, 46, 47
Rank 3	40, 41, 42, 43, 44, 45, 46, 47	10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 30, 31, 32, 33, 34, 35, 36, 37, 40, 41, 42, 43, 44, 45, 46, 47

All-to-All Scattering (assume size of communicator world is N=4):

The size of the receiving buffer must be the same as the size of message sent from sending buffer.

```
int sendBuffer[8], receiveBuffer[8]; // initial contents of receiveBuffer undefined
MPI_Alltoall(sendBuffer, 8, MPI_INT, receiveBuffer, 8, MPI_INT,
MPI_COMM_WORLD);
```

	`sendBuffer`	`receiveBuffer` after `MPI_Alltoall` call
Rank 0	10, 11, 12, 13, 14, 15, 16, 17	10, 11, 20, 21, 30, 31, 40, 41
Rank 1	20, 21, 22, 23, 24, 25, 26, 27	12, 13, 22, 23, 32, 33, 42, 43
Rank 2	30, 31, 32, 33, 34, 35, 36, 37	14, 15, 24, 25, 34, 35, 44, 45
Rank 3	40, 41, 42, 43, 44, 45, 46, 47	16, 17, 26, 27, 36, 37, 46, 47